Storm Water Management Report

Proposed 4 Story Apartment Building

501 Pond Street
Ashland, MA

Prepared By: Bruce Saluk & Associates, Inc.
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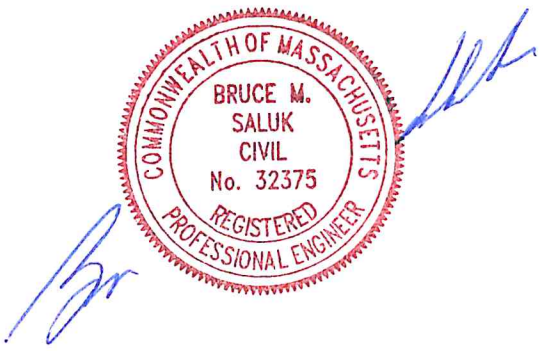

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November 15, 2021
Revised May 18, 2022

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SECTION 1: Site and Storm Water Narrative

SECTION 1: Site and Storm Water Narrative

Purpose

This report includes a comparative analysis for site runoff between existing conditions and proposed full buildout conditions. The stormwater calculations, treatment, and groundwater recharge for the full build out included in Appendix 'A' addresses each of the 10 MassDEP stormwater standards. Section 3 includes an executive summary with peak flows for the 2, 10, 25 & 100 yr. rainfalls. Table 4-1 summarizes the runoff between pre-development and proposed conditions. Operation & Maintenance procedures are provided herein to assure that the ownership has guidelines for both construction stage and long-term water quality control.

Existing Conditions:

The 4.14 Ac. project site is situated on the west side of Pond Street at the Holliston Town Line. The site area consists of a 3.63 Ac. portion of land listed as assessor Parcel 151 on Map 29 and the 0.51 Ac. R.O.W. of Converse Way. This property lies within the 'Highway Commerce' zone and within the 'Pond Street Mixed Overlay District'.

The property is undeveloped and has been used to stockpile clean earth fill. Google earth historic imagery shows that the fill was brought into the property in 2016. Soil testing performed in October 2021 confirms that much of the site beyond the large earth stockpile has also been filled. The disturbed area coverage has new tree grow, grass and weed mixture typical of recent grading operations. Tall arborvitae evergreens forms a vegetative screen along Meeting House Path. The existing 0.25 Ac. of pavement on Converse Way make up the site impervious area. Drainage relief is southerly to a 24" RCP culvert that discharges to an intermittent brook in Holliston. This brook conveys the flow south to Jar Brook, which flows to the Bogastow Brook. Then flows to the Charles River at the Millis/ Medfield Town line.

A smaller area on the north side of the property sheds runoff to an infiltration basin located at the north abutting property. Records show all flow that enters this basin recharges into the ground.

Project Summary:

The proposed development consists of 4 story apartment building. The building will have 120 apartments with a first-floor commercial area. There will be 182 parking spaces and the building will be served by Town water & sewer. Town and utility service connections will be tied into the facilities along Meeting House Path. The site will also be serviced by a Stormwater management system that includes stormwater treatment and groundwater recharge. The existing arborvitae screen along Meeting House Path will be retained.

Low Impact Development:

Listed below are low impact measures, which are included in the Stormwater Management and site design.

1. Large evergreen trees along Meeting House Path will be saved.
2. The parking lot and proposed grades were designed to match existing grades where possible to maintain the natural soil conditions.
3. The proposed groundwater recharge system consisting of 8 separate chamber systems will maximize natural groundwater recharge conditions.
4. Provided is a construction operation and maintenance plan in Appendix 'C' with erosion control measures that include:
   - Assignment of the responsible party to fulfill the goals of erosion control practices.
   - Structural erosion practices to be implemented.
   -Construction Stage erosion control maintenance and inspection procedures with inspection forms
   - Post construction soil stabilization
   - Waste management
   - Emergency spill control
6. Long-Term pollution prevention, Operation, and maintenance plan is provided in Appendix 'B' for long term management, inspection and record keeping.

SECTION 2: Hydrologic Design Criteria

SECTION 2: Hydrologic Design Criteria

1. **DESIGN STORMS:** Both the existing and proposed conditions were analyzed for the 2, 10, 25 and 100-year storm frequencies. The rainfalls used for the above storms were 3.2, 4.5, 5.5 and 7.0 inches, respectively. The rainfall distribution used for each of the storms was a SCS type III, 24-hour rainfall distribution.

2. **METHODOLOGY:** The HYDROCAD Stormwater Modeling Software was used to calculate the runoff and route the hydrographs through the Stormwater system. This Program uses the hydrology techniques developed by the Soil Conservation Services (SCS) now the Natural Resource Conservation Services (NRCS). The runoff values were derived by the SCS unit hydrograph procedure.

3. **HYDROLOGIC SOIL GROUP:** NRCS mapping defined the onsite soil to be comprised of Udorthents soils. Udorthents is not rated by the NRCS. According to NRCS *" Udorthents consist of areas from which soil has been excavated and/or deposited due to construction operations. ……...These areas have been disturbed to the extent that the natural layers of soil are no longer recognizable and are no longer are a major factor in determining limitations or capability of the land."* Soil testing performed at the property confirmed the udorthents soil classification at the upper soil horizons. Although the 'C' horizon soils were found to be natural undisturbed at the soil test locations.

4. Testing shows that an extensive amount of fill has been placed on the site with a loam soil texture. From site soil evaluation a Hydrologic Soil Group(HSG) of 'B' has been assigned for the property.

5. **RUNOFF:** The quantity of rainfall that was calculated as runoff was based on (1) soil types and associated hydrologic soil classification, (2) the area of existing and proposed impervious and pervious surfaces and man-made and natural surface slopes.

SECTION 3: Summary and Conclusions

SECTION 4: Summary & Conclusions

The proposed design fulfills design objectives and complies with MassDEP stormwater performance standards, which include Total Suspended solids Removal(TSS) , groundwater recharge, peak rate of runoff and erosion control. See Appendix 'A' where the narrative and calculations for the MassDEP performance are presented.

A Long-Term Pollution Prevention, Operation & Maintenance Plan for this project is attached in Appendix 'B.'

The Construction Period Operation & Maintenance Plan included in Appendix 'C' will provide measures to eliminate and mitigate construction impacts.

Table 4-1 below summarizes compliance with DEP Standard #2 for Post Development Peak Discharge Rates and provides a comparison for existing & proposed conditions.

TABLE 4-1: EXISTING vs PROPOSED PEAK FLOW (CFS)

DESIGN POINT & RUNOFF CONDITION	**2 YR**	**10YR**	**25YR**	**100YR**
TOTAL SITE RUNOFF				
-EXISTING CONDITIONS	1.93	5.37	8.52	13.74
- PROPOSED CONDITIONS	1.03	4.89	7.37	13.46
% REDUCTION (TOTAL)	47%	9%	14%	2%

The flow values given in Table 4-1 were taken from the HYDROCAD calculations in Appendix "F" . Refer to Appendix 'F' for more information on runoff coverages, soils conditions, times of concentration, runoff rates, etc.

APPENDIX A
DEP Stormwater Management

Documentation & Calculations for DEP Stormwater Management Policy Standards

This project will meet the Stormwater Management Standards. The proposed Best Management Practices (BMP's) will reduce and improve the water quality leaving the site. The following stormwater management standards pertain to the Massachusetts DEP Stormwater Policy.

Standard #1-Untreated Stormwater

This project was designed to not discharge untreated contaminated stormwater into, or cause erosion to wetlands or waters of the Commonwealth. The stormwater discharge treatment from the proposed project will exceed 80% TSS removal from runoff leaving the site. Refer to Standard #4 below where TSS removal calculations are provided. A small portion of the site is situated below the Water Quality system, but the overall TSS removal will exceed 80% for the site. The small area meets the criteria for De Minimus site discharge in Vol. 3, Chap. 1, page 34 of the Mass Stormwater Handbook.

Standard #2-Post Development Peak Discharge Rates

All performance requirements for this standard have been met. Refer to summary and conclusions in Section 3 of this report where runoff flow summaries for both predevelopment and proposed conditions are given.

Standard #3-Recharge to Groundwater

Full performance requirements for this standard have been met.
Calculations for runoff are based on hydrologic soil groups (HSG) "B" for the site runoff. The target depth factor calculating the required recharge volume in the Stormwater Management Policy (SMP) is as follows:

NRCS Soil Group	Target depth factor (F)
A	0.6-inch
B	0.35-inch
C	0.25-inch
D	0.1-inch

The proposed impervious area for the proposed development = 2.83 Ac.

The required ground water recharge for full build out is:

Rv= F (impervious area)
RV=required recharge volume
F=target depth factor
The factor for HSG "B" is 0.35-inch *@ 2.83 Ac.*

SITE RUNOFF Rv

Rv(DEP)= (0.35-inch) x (1FT/12inches) (2.83 Ac) (43,560 SF/Ac.)=3596 CF

The above Rv and WQF values will be met by the proposed chambers systems as follows:

PROPOSED RECHARGE VOLUME

The "Simple Dynamic Method" was used to determine the available storage volume:

Proposed system capacity calculation using the Simple Dynamic Method:

- Roof Infiltration Simple Dynamic Method.

The proposed method for recharge will be eight(8) chamber systems using Cultec chambers embedded in stone. The material dimensions and quantities are summarized below, as well included on the detail sheet.

CHAMBER SYSTEM SCHEDULE

Chamber System(CS)	Chamber Type	Quantity	No.of Rows	Stone Dimensions (FT)	Storage Below Pipe Invert(CF)
CS#1	R180HD	30	3	12'W x 68'L x 2.8'H	163
CS#2	R180HD	60	4	16'W x 99'L x 2.8'H	317
CS#3	R180HD	45	3	12'W x 99'L x 2.8'H	238
CS#4	R150XLHD	63	7	25'W x 95'L x 2.8'H	475
CS#5	R150XLHD	112	7	25'W x 167'L x 2.8'H	835
CS#6	R180HD	36	4	16'W x 61'L x 2.8'H	195
CS#7	R180HD	99	3	12'W x 212'L x 3.0'H	509
CS#8	C100HD	39	3	12'W x 110'L x 2.8'H	264
				Total retained Runoff Volume= 2996 CF	

The HYDROCAD calculations for the Simple Dynamic Method on the following pages include the recharge and storage capacities for the eight(8) chamber systems. The summary for these calculations is:

- Volume recharged over 2 HR period for 5 chamber systems……=4018 CF
- Volume of storage below pipe inverts in 5 chamber systems……= 2996 CF

Total Recharge Volume provided……= 7014 CF

TOTAL Recharge capacity provided =7014 CF > Rv(3596 CF required)

Check for BMP draw down time:

Roof DW draw down time =2.8 FT/0.689 FT/hr……= 4.1 hr. < 72hr

Standard #4 (Water Quality)

TSS removal will be met by using deep sump catch basins followed by 2 Water Quality Inlet proprietary treatment units by Contech, 2 Forebays and Roof Dry wells. A long-term pollution prevention & Operation and Maintenance plan is included in Appendix "B" of this report.
.
Vwq= DwqxAwq

Vwq= water quality volume (CF)
Dwq= water quality depth (inches)
Awq=On site Impervious area proposed (Ac.)

The required water quality volume is 1-INCH.
The design meets Standard #4 criteria for a 1-inch WQV.

Removal of TSS meets DEP Requirements. See proprietary TSS removal and calculation sheets for TSS removal and Excel spreadsheet included in the next page.

TSS will be removed by the following means:

- Fifteen (15) Water Quality Inlet proprietary treatment units by Contech
- Eight(8) chamber systems

The TSS treatment system is designed to remove greater than 80% of the TSS from the catchment area.

The TSS efficiency values in the TSS calculations were taken from DEP SWMP, Volume 1, Chapter 1, Table 'TSS' (Revised 2008) and the TSS removal for the proprietary units were provided by Contech.

Refer to the following TSS removal calculations showing how TSS is removed from the stormwater

Standard #5 Land Uses with Higher Potential Pollutant Loads (LUHPPLs)

This project land use is not subject to higher pollution control requirements

Standard #6 (Protection of Critical Areas)

The project is not located near a Critical area.

Standard #7 (Redevelopment)

This site is not a redevelopment project.

Standard #8 (Erosion /Sediment Control)

This standard has been fully met. Refer to the “Construction Period Operation and Maintenance Plan” included in Appendix ‘C’

Standard #9 (Operation & Maintenance Plan)

This standard has been fully met. Refer to the Long-Term Pollution Prevention & Operation and Maintenance Plan in Appendix “B”

Standard #10 (Illicit Discharge Compliance Statement)

This standard has been fully met. The applicant will submit an illicit discharge compliance statement prior to the discharge of any stormwater to post-development BMP’s.

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WQI's

TSS Removal Calculation Worksheet

Name: Proposed 4 Story Apartment

Proj. No.: 2874
Date:5/20/22
Location: Pond ST & Converse Way, Ashland, MA
Computed by: BMS

1 & 5 imperv. Area 0.35 Ac.	A BMP	B TSS Removal Rate (%)	C Starting TSS Load*	D Amount Removed (BxC)	E Remaining Load (C-D)
	WQI's	94	1.00	0.94	0.06
	DW	0	0.06	0.00	0.06
		0	0.06	0.00	0.06

Total TSS Removal = **94%**

Notes:
1) Starting TSS Load for first BMP= 1.00. TSS load for subsequent BMP's is equal to the Remaining Load (E) from the previous BMP.

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WQI's

TSS Removal Calculation Worksheet

Name: Pond ST & Converse Way

Proj. No.: 2874
Date: 5/20/22
Location: Pond ST & Converse Way, Ashland, MA
Computed by: BMS

3,6,10 & 11 imperv. Area 0.53 Ac.	A BMP	B TSS Removal Rate (%)	C Starting TSS Load*	D Amount Removed (BxC)	E Remaining Load (C-D)
	WQI's	95	1.00	0.95	0.05
	DW	0	0.05	0.00	0.05
		0	0.05	0.00	0.05
			Total TSS Removal =	**95%**	

Notes:
1) Starting TSS Load for first BMP= 1.00. TSS load for subsequent BMP's is equal to the Remaining Load (E) from the previous BMP.

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WQI's

TSS Removal Calculation Worksheet

Name: Pond ST & Converse Way

Proj. No.: 2874

Date: 5/20/22

Location: Pond ST & Converse Way
Ashland, MA

Computed by: BMS

2,7,9A,9B & 12 imperv. Area 0.53 Ac.	A BMP	B TSS Removal Rate (%)	C Starting TSS Load*	D Amount Removed (BxC)	E Remaining Load (C-D)
	WQI's	96	1.00	0.96	0.04
	DW	0	0.04	0.00	0.04
		0	0.04	0.00	0.04
			Total TSS Removal =	**96%**	

Notes:
1) Starting TSS Load for first BMP= 1.00. TSS load for subsequent BMP's is equal to the Remaining Load (E) from the previous BMP.

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WQI's

TSS Removal Calculation Worksheet

Name: Proposed 4 Story Apartment

Proj. No.: 2874

Date: 05/20/22

Location: Pond ST & Converse Way, Ashland, MA

Computed by: BMS

4 & 8 imperv. Area 0.16 Ac.

A BMP	B TSS Removal Rate (%)	C Starting TSS Load*	D Amount Removed (BxC)	E Remaining Load (C-D)
WQI's	97	1.00	0.97	0.03
DW	0	0.03	0.00	0.03
	0	0.03	0.00	0.03

Total TSS Removal = **97%**

Notes:

1) Starting TSS Load for first BMP= 1.00. TSS load for subsequent BMP's is equal to the Remaining Load (E) from the previous BMP.

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WQI'S

TSS Removal Calculation Worksheet

Name: Proposed 4 Story Apartment

Proj. No.: 2874
Date: 05/20/22
Location: Pond ST & Converse Way, Ashland, MA
Computed by: BMS

13 & 14 imperv. Area 0.10 Ac.

A BMP	B TSS Removal Rate (%)	C Starting TSS Load*	D Amount Removed (BxC)	E Remaining Load (C-D)
WQI	98	1.00	0.98	0.02
DW	0	0.02	0.00	0.02
	0	0.02	0.00	0.02

Total TSS Removal = **98%**

Notes:
1) Starting TSS Load for first BMP= 1.00. TSS load for subsequent BMP's is equal to the Remaining Load (E) from the previous BMP.

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TSS Removal Calculation Worksheet

Name: Proposed 4 Story Apartment

Proj. No.: 2874
Date: 5/20/22
Location: Pond ST & Converse Way, Ashland, MA
Computed by: BMS

Roof Area

imperv. Area 0.91 Ac.

A BMP	B TSS Removal Rate (%)	C Starting TSS Load*	D Amount Removed (BxC)	E Remaining Load (C-D)
ROOF RECHARGE	80	1.00	0.80	0.20

Total TSS Removal = **80%**

Notes:
*) Starting TSS Load for first BMP= 1.00. TSS load for subsequent BMP's is equal to the Remaining Load (E) from the previous BMP.

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TSS Removal Calculation Worksheet

Name: Proposed 4 Story Apartment
Proj. No.: 2874
Date: 5/20/22
Location: Pond ST & Converse Way
Ashland, MA
Computed by: BMS

TSS SUMMARY SHEET

Total impervious site area=2.83 Ac.

Site TSS Removal : $\frac{[(94x0.35Ac)+(95x0.53Ac)+(96x0.53Ac)+(97+0.16Ac)+(80x0.91Ac)+(98X0.10Ac.)]x100}{2.83\ Ac} = 82\%$

Project: Pond Street
Location: Ashland, MA
Prepared For: Bruce Saluk & Associates

Purpose: To calculate the water quality flow rate (WQF) over a given site area. In this situation the WQF is derived from the first 1" of runoff from the contributing impervious surface.

Reference: Massachusetts Dept. of Environmental Protection Wetlands Program / United States Department of Agriculture Natural Resources Conservation Service TR-55 Manual

Procedure: Determine unit peak discharge using Figure 1 or 2. Figure 2 is in tabular form so is preferred. Using the tc, read the unit peak discharge (qu) from Figure 1 or Table in Figure 2. qu is expressed in the following units: cfs/mi^2/watershed inches (csm/in).

Compute Q Rate using the following equation:

$$Q = (qu)\ (A)\ (WQV)$$

where:

Q = flow rate associated with first 1" of runoff
qu = the unit peak discharge, in csm/in.
A = impervious surface drainage area (in square miles)
WQV = water quality volume in watershed inches (1" in this case)

Structure Name	Impv. (acres)	A (miles^2)	t_c (min)	t_c (hr)	WQV (in)	qu (csm/in.)	Q (cfs)
WQI #1	0.19	0.0002969	6.0	0.100	1.00	774.00	0.23
WQI #2	0.10	0.0001563	6.0	0.100	1.00	774.00	0.12
WQI #3	0.13	0.0002031	6.0	0.100	1.00	774.00	0.16
WQI #4	0.08	0.0001250	6.0	0.100	1.00	774.00	0.10
WQI #5	0.16	0.0002500	6.0	0.100	1.00	774.00	0.19
WQI #6	0.14	0.0002188	6.0	0.100	1.00	774.00	0.17
WQI #7	0.11	0.0001719	6.0	0.100	1.00	774.00	0.13
WQI #8	0.08	0.0001250	6.0	0.100	1.00	774.00	0.10
WQI #9A	0.10	0.0001563	6.0	0.100	1.00	774.00	0.12
WQI #9B	0.11	0.0001719	6.0	0.100	1.00	774.00	0.13
WQI #10	0.13	0.0002031	6.0	0.100	1.00	774.00	0.16
WQI #11	0.12	0.0001875	6.0	0.100	1.00	774.00	0.15
WQI #12	0.11	0.0001719	6.0	0.100	1.00	774.00	0.13
WQI #13	0.05	0.0000781	6.0	0.100	1.00	774.00	0.06
WQI #14	0.05	0.0000781	6.0	0.100	1.00	774.00	0.06

Brief Stormceptor Sizing Report - WQI #1

Project Information & Location			
Project Name	Pond Street	**Project Number**	694516
City	Ashland	**State/ Province**	Massachusetts
Country	United States of America	**Date**	11/15/2021
Designer Information		**EOR Information (optional)**	
Name	Josh Stackhouse	**Name**	
Company	Contech Engineered Solutions	**Company**	
Phone #	207-219-9110	**Phone #**	
Email	joshua.stackhouse@conteches.com	**Email**	

Stormwater Treatment Recommendation
The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	WQI #1
Target TSS Removal (%)	80
TSS Removal (%) Provided	94
Recommended Stormceptor Model	STC 450i

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 450i	94
STC 900	97
STC 1200	97
STC 1800	97
STC 2400	98
STC 3600	98
STC 4800	99
STC 6000	99
STC 7200	99
STC 11000	99
STC 13000	99
STC 16000	100

Sizing Details

Drainage Area

Total Area (acres)	0.19
Imperviousness %	100.0

Rainfall

Station Name	BOSTON WSFO AP
State/Province	Massachusetts
Station ID #	0770
Years of Records	58
Latitude	42°21'38"N
Longitude	71°0'38"W

Water Quality Objective

TSS Removal (%)	80.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (Gal)	
Peak Conveyed Flow Rate (CFS)	
Water Quality Flow Rate (CFS)	

Up Stream Storage

Storage (ac-ft)	Discharge (cfs)
0.000	0.000

Up Stream Flow Diversion

Max. Flow to Stormceptor (cfs)	

Particle Size Distribution (PSD)
The selected PSD defines TSS removal

OK-110

Particle Diameter (microns)	Distribution %	Specific Gravity
1.0	0.0	2.65
53.0	3.0	2.65
75.0	15.0	2.65
88.0	25.0	2.65
106.0	41.0	2.65
125.0	15.0	2.65
150.0	1.0	2.65
212.0	0.0	2.65

Notes

• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

For Stormceptor Specifications and Drawings Please Visit:
https://www.conteches.com/technical-guides/search?filter=1WBC0O5EYX

Brief Stormceptor Sizing Report - WQI #2

Project Information & Location			
Project Name	Pond Street	**Project Number**	694516
City	Ashland	**State/ Province**	Massachusetts
Country	United States of America	**Date**	11/15/2021
Designer Information		**EOR Information (optional)**	
Name	Josh Stackhouse	**Name**	
Company	Contech Engineered Solutions	**Company**	
Phone #	207-219-9110	**Phone #**	
Email	joshua.stackhouse@conteches.com	**Email**	

Stormwater Treatment Recommendation
The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	WQI #2
Target TSS Removal (%)	80
TSS Removal (%) Provided	96
Recommended Stormceptor Model	STC 450i

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 450i	96
STC 900	98
STC 1200	98
STC 1800	98
STC 2400	99
STC 3600	99
STC 4800	99
STC 6000	99
STC 7200	99
STC 11000	100
STC 13000	100
STC 16000	100

Sizing Details

Drainage Area

Total Area (acres)	0.10
Imperviousness %	100.0

Rainfall

Station Name	BOSTON WSFO AP
State/Province	Massachusetts
Station ID #	0770
Years of Records	58
Latitude	42°21'38"N
Longitude	71°0'38"W

Water Quality Objective

TSS Removal (%)	80.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (Gal)	
Peak Conveyed Flow Rate (CFS)	
Water Quality Flow Rate (CFS)	

Up Stream Storage

Storage (ac-ft)	Discharge (cfs)
0.000	0.000

Up Stream Flow Diversion

Max. Flow to Stormceptor (cfs)	

Particle Size Distribution (PSD)
The selected PSD defines TSS removal

OK-110

Particle Diameter (microns)	Distribution %	Specific Gravity
1.0	0.0	2.65
53.0	3.0	2.65
75.0	15.0	2.65
88.0	25.0	2.65
106.0	41.0	2.65
125.0	15.0	2.65
150.0	1.0	2.65
212.0	0.0	2.65

Notes

• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

For Stormceptor Specifications and Drawings Please Visit:
https://www.conteches.com/technical-guides/search?filter=1WBC0O5EYX

Brief Stormceptor Sizing Report - WQI #3

Project Information & Location			
Project Name	Pond Street	**Project Number**	694516
City	Ashland	**State/ Province**	Massachusetts
Country	United States of America	**Date**	11/15/2021
Designer Information		**EOR Information (optional)**	
Name	Josh Stackhouse	**Name**	
Company	Contech Engineered Solutions	**Company**	
Phone #	207-219-9110	**Phone #**	
Email	joshua.stackhouse@conteches.com	**Email**	

Stormwater Treatment Recommendation
The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	WQI #3
Target TSS Removal (%)	80
TSS Removal (%) Provided	95
Recommended Stormceptor Model	STC 450i

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 450i	95
STC 900	97
STC 1200	98
STC 1800	98
STC 2400	98
STC 3600	99
STC 4800	99
STC 6000	99
STC 7200	99
STC 11000	100
STC 13000	100
STC 16000	100

Sizing Details

Drainage Area

Total Area (acres)	0.13
Imperviousness %	100.0

Rainfall

Station Name	BOSTON WSFO AP
State/Province	Massachusetts
Station ID #	0770
Years of Records	58
Latitude	42°21'38"N
Longitude	71°0'38"W

Water Quality Objective

TSS Removal (%)	80.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (Gal)	
Peak Conveyed Flow Rate (CFS)	
Water Quality Flow Rate (CFS)	

Up Stream Storage

Storage (ac-ft)	Discharge (cfs)
0.000	0.000

Up Stream Flow Diversion

Max. Flow to Stormceptor (cfs)	

Particle Size Distribution (PSD)
The selected PSD defines TSS removal

OK-110

Particle Diameter (microns)	Distribution %	Specific Gravity
1.0	0.0	2.65
53.0	3.0	2.65
75.0	15.0	2.65
88.0	25.0	2.65
106.0	41.0	2.65
125.0	15.0	2.65
150.0	1.0	2.65
212.0	0.0	2.65

Notes

• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

For Stormceptor Specifications and Drawings Please Visit:
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Brief Stormceptor Sizing Report - WQI #4

Project Information & Location			
Project Name	Pond Street	**Project Number**	694516
City	Ashland	**State/ Province**	Massachusetts
Country	United States of America	**Date**	11/15/2021
Designer Information		**EOR Information (optional)**	
Name	Josh Stackhouse	**Name**	
Company	Contech Engineered Solutions	**Company**	
Phone #	207-219-9110	**Phone #**	
Email	joshua.stackhouse@conteches.com	**Email**	

Stormwater Treatment Recommendation
The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	WQI #4
Target TSS Removal (%)	80
TSS Removal (%) Provided	97
Recommended Stormceptor Model	STC 450i

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 450i	97
STC 900	98
STC 1200	98
STC 1800	99
STC 2400	99
STC 3600	99
STC 4800	99
STC 6000	99
STC 7200	100
STC 11000	100
STC 13000	100
STC 16000	100

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Sizing Details

Drainage Area	
Total Area (acres)	0.08
Imperviousness %	100.0

Rainfall	
Station Name	BOSTON WSFO AP
State/Province	Massachusetts
Station ID #	0770
Years of Records	58
Latitude	42°21'38"N
Longitude	71°0'38"W

Water Quality Objective	
TSS Removal (%)	80.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (Gal)	
Peak Conveyed Flow Rate (CFS)	
Water Quality Flow Rate (CFS)	

Up Stream Storage	
Storage (ac-ft)	Discharge (cfs)
0.000	0.000

Up Stream Flow Diversion	
Max. Flow to Stormceptor (cfs)	

Particle Size Distribution (PSD)
The selected PSD defines TSS removal

OK-110

Particle Diameter (microns)	Distribution %	Specific Gravity
1.0	0.0	2.65
53.0	3.0	2.65
75.0	15.0	2.65
88.0	25.0	2.65
106.0	41.0	2.65
125.0	15.0	2.65
150.0	1.0	2.65
212.0	0.0	2.65

Notes

• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

For Stormceptor Specifications and Drawings Please Visit:
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Brief Stormceptor Sizing Report - WQI #5

Project Information & Location			
Project Name	Pond Street	**Project Number**	694516
City	Ashland	**State/ Province**	Massachusetts
Country	United States of America	**Date**	11/15/2021
Designer Information		**EOR Information (optional)**	
Name	Josh Stackhouse	**Name**	
Company	Contech Engineered Solutions	**Company**	
Phone #	207-219-9110	**Phone #**	
Email	joshua.stackhouse@conteches.com	**Email**	

Stormwater Treatment Recommendation
The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	WQI #5
Target TSS Removal (%)	80
TSS Removal (%) Provided	94
Recommended Stormceptor Model	STC 450i

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 450i	94
STC 900	97
STC 1200	97
STC 1800	97
STC 2400	98
STC 3600	98
STC 4800	99
STC 6000	99
STC 7200	99
STC 11000	99
STC 13000	100
STC 16000	100

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Sizing Details

Drainage Area

Total Area (acres)	0.16
Imperviousness %	100.0

Rainfall

Station Name	BOSTON WSFO AP
State/Province	Massachusetts
Station ID #	0770
Years of Records	58
Latitude	42°21'38"N
Longitude	71°0'38"W

Water Quality Objective

TSS Removal (%)	80.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (Gal)	
Peak Conveyed Flow Rate (CFS)	
Water Quality Flow Rate (CFS)	

Up Stream Storage

Storage (ac-ft)	Discharge (cfs)
0.000	0.000

Up Stream Flow Diversion

Max. Flow to Stormceptor (cfs)	

Particle Size Distribution (PSD)
The selected PSD defines TSS removal

OK-110

Particle Diameter (microns)	Distribution %	Specific Gravity
1.0	0.0	2.65
53.0	3.0	2.65
75.0	15.0	2.65
88.0	25.0	2.65
106.0	41.0	2.65
125.0	15.0	2.65
150.0	1.0	2.65
212.0	0.0	2.65

Notes

• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

For Stormceptor Specifications and Drawings Please Visit:
https://www.conteches.com/technical-guides/search?filter=1WBC0O5EYX

Brief Stormceptor Sizing Report - WQI #6

Project Information & Location			
Project Name	Pond Street	**Project Number**	694516
City	Ashland	**State/ Province**	Massachusetts
Country	United States of America	**Date**	11/15/2021
Designer Information		**EOR Information (optional)**	
Name	Josh Stackhouse	**Name**	
Company	Contech Engineered Solutions	**Company**	
Phone #	207-219-9110	**Phone #**	
Email	joshua.stackhouse@conteches.com	**Email**	

Stormwater Treatment Recommendation
The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	WQI #6
Target TSS Removal (%)	80
TSS Removal (%) Provided	95
Recommended Stormceptor Model	STC 450i

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 450i	95
STC 900	97
STC 1200	97
STC 1800	98
STC 2400	98
STC 3600	99
STC 4800	99
STC 6000	99
STC 7200	99
STC 11000	100
STC 13000	100
STC 16000	100

Sizing Details

Drainage Area

Total Area (acres)	0.14
Imperviousness %	100.0

Rainfall

Station Name	BOSTON WSFO AP
State/Province	Massachusetts
Station ID #	0770
Years of Records	58
Latitude	42°21'38"N
Longitude	71°0'38"W

Water Quality Objective

TSS Removal (%)	80.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (Gal)	
Peak Conveyed Flow Rate (CFS)	
Water Quality Flow Rate (CFS)	

Up Stream Storage

Storage (ac-ft)	Discharge (cfs)
0.000	0.000

Up Stream Flow Diversion

Max. Flow to Stormceptor (cfs)	

Particle Size Distribution (PSD)
The selected PSD defines TSS removal

OK-110

Particle Diameter (microns)	Distribution %	Specific Gravity
1.0	0.0	2.65
53.0	3.0	2.65
75.0	15.0	2.65
88.0	25.0	2.65
106.0	41.0	2.65
125.0	15.0	2.65
150.0	1.0	2.65
212.0	0.0	2.65

Notes

• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

For Stormceptor Specifications and Drawings Please Visit:
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Brief Stormceptor Sizing Report - WQI #7

Project Information & Location			
Project Name	Pond Street	**Project Number**	694516
City	Ashland	**State/ Province**	Massachusetts
Country	United States of America	**Date**	11/15/2021
Designer Information		**EOR Information (optional)**	
Name	Josh Stackhouse	**Name**	
Company	Contech Engineered Solutions	**Company**	
Phone #	207-219-9110	**Phone #**	
Email	joshua.stackhouse@conteches.com	**Email**	

Stormwater Treatment Recommendation
The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	WQI #7
Target TSS Removal (%)	80
TSS Removal (%) Provided	96
Recommended Stormceptor Model	STC 450i

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 450i	96
STC 900	98
STC 1200	98
STC 1800	98
STC 2400	99
STC 3600	99
STC 4800	99
STC 6000	99
STC 7200	99
STC 11000	100
STC 13000	100
STC 16000	100

Sizing Details

Drainage Area

Total Area (acres)	0.11
Imperviousness %	100.0

Rainfall

Station Name	BOSTON WSFO AP
State/Province	Massachusetts
Station ID #	0770
Years of Records	58
Latitude	42°21'38"N
Longitude	71°0'38"W

Water Quality Objective

TSS Removal (%)	80.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (Gal)	
Peak Conveyed Flow Rate (CFS)	
Water Quality Flow Rate (CFS)	

Up Stream Storage

Storage (ac-ft)	Discharge (cfs)
0.000	0.000

Up Stream Flow Diversion

Max. Flow to Stormceptor (cfs)	

Particle Size Distribution (PSD)
The selected PSD defines TSS removal

OK-110

Particle Diameter (microns)	Distribution %	Specific Gravity
1.0	0.0	2.65
53.0	3.0	2.65
75.0	15.0	2.65
88.0	25.0	2.65
106.0	41.0	2.65
125.0	15.0	2.65
150.0	1.0	2.65
212.0	0.0	2.65

Notes

• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

For Stormceptor Specifications and Drawings Please Visit:
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Brief Stormceptor Sizing Report - WQI #8

Project Information & Location			
Project Name	Pond Street	**Project Number**	694516
City	Ashland	**State/ Province**	Massachusetts
Country	United States of America	**Date**	11/15/2021
Designer Information		**EOR Information (optional)**	
Name	Josh Stackhouse	**Name**	
Company	Contech Engineered Solutions	**Company**	
Phone #	207-219-9110	**Phone #**	
Email	joshua.stackhouse@conteches.com	**Email**	

Stormwater Treatment Recommendation
The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	WQI #8
Target TSS Removal (%)	80
TSS Removal (%) Provided	97
Recommended Stormceptor Model	STC 450i

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 450i	97
STC 900	98
STC 1200	98
STC 1800	99
STC 2400	99
STC 3600	99
STC 4800	99
STC 6000	99
STC 7200	100
STC 11000	100
STC 13000	100
STC 16000	100

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Sizing Details

Drainage Area	
Total Area (acres)	0.08
Imperviousness %	100.0

Rainfall	
Station Name	BOSTON WSFO AP
State/Province	Massachusetts
Station ID #	0770
Years of Records	58
Latitude	42°21'38"N
Longitude	71°0'38"W

Water Quality Objective	
TSS Removal (%)	80.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (Gal)	
Peak Conveyed Flow Rate (CFS)	
Water Quality Flow Rate (CFS)	

Up Stream Storage	
Storage (ac-ft)	Discharge (cfs)
0.000	0.000

Up Stream Flow Diversion	
Max. Flow to Stormceptor (cfs)	

Particle Size Distribution (PSD)
The selected PSD defines TSS removal

OK-110

Particle Diameter (microns)	Distribution %	Specific Gravity
1.0	0.0	2.65
53.0	3.0	2.65
75.0	15.0	2.65
88.0	25.0	2.65
106.0	41.0	2.65
125.0	15.0	2.65
150.0	1.0	2.65
212.0	0.0	2.65

Notes

• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

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Brief Stormceptor Sizing Report - WQI #9A

Project Information & Location			
Project Name	Pond Street	**Project Number**	694516
City	Ashland	**State/ Province**	Massachusetts
Country	United States of America	**Date**	11/15/2021
Designer Information		**EOR Information (optional)**	
Name	Josh Stackhouse	**Name**	
Company	Contech Engineered Solutions	**Company**	
Phone #	207-219-9110	**Phone #**	
Email	joshua.stackhouse@conteches.com	**Email**	

Stormwater Treatment Recommendation
The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	WQI #9A
Target TSS Removal (%)	80
TSS Removal (%) Provided	96
Recommended Stormceptor Model	STC 450i

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 450i	96
STC 900	98
STC 1200	98
STC 1800	98
STC 2400	99
STC 3600	99
STC 4800	99
STC 6000	99
STC 7200	99
STC 11000	100
STC 13000	100
STC 16000	100

Sizing Details

Drainage Area

Total Area (acres)	0.10
Imperviousness %	100.0

Rainfall

Station Name	BOSTON WSFO AP
State/Province	Massachusetts
Station ID #	0770
Years of Records	58
Latitude	42°21'38"N
Longitude	71°0'38"W

Water Quality Objective

TSS Removal (%)	80.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (Gal)	
Peak Conveyed Flow Rate (CFS)	
Water Quality Flow Rate (CFS)	

Up Stream Storage

Storage (ac-ft)	Discharge (cfs)
0.000	0.000

Up Stream Flow Diversion

Max. Flow to Stormceptor (cfs)	

Particle Size Distribution (PSD)
The selected PSD defines TSS removal

OK-110

Particle Diameter (microns)	Distribution %	Specific Gravity
1.0	0.0	2.65
53.0	3.0	2.65
75.0	15.0	2.65
88.0	25.0	2.65
106.0	41.0	2.65
125.0	15.0	2.65
150.0	1.0	2.65
212.0	0.0	2.65

Notes

• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

For Stormceptor Specifications and Drawings Please Visit:
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Brief Stormceptor Sizing Report - WQI #9B

Project Information & Location			
Project Name	Pond Street	**Project Number**	694516
City	Ashland	**State/ Province**	Massachusetts
Country	United States of America	**Date**	11/15/2021
Designer Information		**EOR Information (optional)**	
Name	Josh Stackhouse	**Name**	
Company	Contech Engineered Solutions	**Company**	
Phone #	207-219-9110	**Phone #**	
Email	joshua.stackhouse@conteches.com	**Email**	

Stormwater Treatment Recommendation
The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	WQI #9B
Target TSS Removal (%)	80
TSS Removal (%) Provided	96
Recommended Stormceptor Model	STC 450i

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 450i	96
STC 900	98
STC 1200	98
STC 1800	98
STC 2400	99
STC 3600	99
STC 4800	99
STC 6000	99
STC 7200	99
STC 11000	100
STC 13000	100
STC 16000	100

Sizing Details

Drainage Area

Total Area (acres)	0.11
Imperviousness %	100.0

Rainfall

Station Name	BOSTON WSFO AP
State/Province	Massachusetts
Station ID #	0770
Years of Records	58
Latitude	42°21'38"N
Longitude	71°0'38"W

Water Quality Objective

TSS Removal (%)	80.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (Gal)	
Peak Conveyed Flow Rate (CFS)	
Water Quality Flow Rate (CFS)	

Up Stream Storage

Storage (ac-ft)	Discharge (cfs)
0.000	0.000

Up Stream Flow Diversion

Max. Flow to Stormceptor (cfs)	

Particle Size Distribution (PSD)
The selected PSD defines TSS removal

OK-110

Particle Diameter (microns)	Distribution %	Specific Gravity
1.0	0.0	2.65
53.0	3.0	2.65
75.0	15.0	2.65
88.0	25.0	2.65
106.0	41.0	2.65
125.0	15.0	2.65
150.0	1.0	2.65
212.0	0.0	2.65

Notes

• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

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Brief Stormceptor Sizing Report - WQI #10

Project Information & Location			
Project Name	Pond Street	**Project Number**	694516
City	Ashland	**State/ Province**	Massachusetts
Country	United States of America	**Date**	11/15/2021
Designer Information		**EOR Information (optional)**	
Name	Josh Stackhouse	**Name**	
Company	Contech Engineered Solutions	**Company**	
Phone #	207-219-9110	**Phone #**	
Email	joshua.stackhouse@conteches.com	**Email**	

Stormwater Treatment Recommendation
The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	WQI #10
Target TSS Removal (%)	80
TSS Removal (%) Provided	95
Recommended Stormceptor Model	STC 450i

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 450i	95
STC 900	97
STC 1200	98
STC 1800	98
STC 2400	98
STC 3600	99
STC 4800	99
STC 6000	99
STC 7200	99
STC 11000	100
STC 13000	100
STC 16000	100

Sizing Details

Drainage Area

Total Area (acres)	0.13
Imperviousness %	100.0

Rainfall

Station Name	BOSTON WSFO AP
State/Province	Massachusetts
Station ID #	0770
Years of Records	58
Latitude	42°21'38"N
Longitude	71°0'38"W

Water Quality Objective

TSS Removal (%)	80.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (Gal)	
Peak Conveyed Flow Rate (CFS)	
Water Quality Flow Rate (CFS)	

Up Stream Storage

Storage (ac-ft)	Discharge (cfs)
0.000	0.000

Up Stream Flow Diversion

Max. Flow to Stormceptor (cfs)	

Particle Size Distribution (PSD)
The selected PSD defines TSS removal

OK-110

Particle Diameter (microns)	Distribution %	Specific Gravity
1.0	0.0	2.65
53.0	3.0	2.65
75.0	15.0	2.65
88.0	25.0	2.65
106.0	41.0	2.65
125.0	15.0	2.65
150.0	1.0	2.65
212.0	0.0	2.65

Notes

• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

For Stormceptor Specifications and Drawings Please Visit:
https://www.conteches.com/technical-guides/search?filter=1WBC0O5EYX

Brief Stormceptor Sizing Report - WQI #11

Project Information & Location			
Project Name	Pond Street	**Project Number**	694516
City	Ashland	**State/ Province**	Massachusetts
Country	United States of America	**Date**	11/15/2021
Designer Information		**EOR Information (optional)**	
Name	Josh Stackhouse	**Name**	
Company	Contech Engineered Solutions	**Company**	
Phone #	207-219-9110	**Phone #**	
Email	joshua.stackhouse@conteches.com	**Email**	

Stormwater Treatment Recommendation
The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	WQI #11
Target TSS Removal (%)	80
TSS Removal (%) Provided	95
Recommended Stormceptor Model	STC 450i

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 450i	95
STC 900	98
STC 1200	98
STC 1800	98
STC 2400	99
STC 3600	99
STC 4800	99
STC 6000	99
STC 7200	99
STC 11000	100
STC 13000	100
STC 16000	100

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Sizing Details

Drainage Area	
Total Area (acres)	0.12
Imperviousness %	100.0

Rainfall	
Station Name	BOSTON WSFO AP
State/Province	Massachusetts
Station ID #	0770
Years of Records	58
Latitude	42°21'38"N
Longitude	71°0'38"W

Water Quality Objective	
TSS Removal (%)	80.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (Gal)	
Peak Conveyed Flow Rate (CFS)	
Water Quality Flow Rate (CFS)	

Up Stream Storage	
Storage (ac-ft)	Discharge (cfs)
0.000	0.000

Up Stream Flow Diversion	
Max. Flow to Stormceptor (cfs)	

Particle Size Distribution (PSD)
The selected PSD defines TSS removal

OK-110

Particle Diameter (microns)	Distribution %	Specific Gravity
1.0	0.0	2.65
53.0	3.0	2.65
75.0	15.0	2.65
88.0	25.0	2.65
106.0	41.0	2.65
125.0	15.0	2.65
150.0	1.0	2.65
212.0	0.0	2.65

Notes

• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

For Stormceptor Specifications and Drawings Please Visit:
https://www.conteches.com/technical-guides/search?filter=1WBC0O5EYX

Brief Stormceptor Sizing Report - WQI #13

Project Information & Location			
Project Name	Pond Street	**Project Number**	694516
City	Ashland	**State/ Province**	Massachusetts
Country	United States of America	**Date**	11/15/2021
Designer Information		**EOR Information (optional)**	
Name	Josh Stackhouse	**Name**	
Company	Contech Engineered Solutions	**Company**	
Phone #	207-219-9110	**Phone #**	
Email	joshua.stackhouse@conteches.com	**Email**	

Stormwater Treatment Recommendation
The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	WQI #13
Target TSS Removal (%)	80
TSS Removal (%) Provided	98
Recommended Stormceptor Model	STC 450i

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 450i	98
STC 900	99
STC 1200	99
STC 1800	99
STC 2400	99
STC 3600	99
STC 4800	100
STC 6000	100
STC 7200	100
STC 11000	100
STC 13000	100
STC 16000	100

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Sizing Details

Drainage Area	
Total Area (acres)	0.05
Imperviousness %	100.0

Rainfall	
Station Name	BOSTON WSFO AP
State/Province	Massachusetts
Station ID #	0770
Years of Records	58
Latitude	42°21'38"N
Longitude	71°0'38"W

Water Quality Objective	
TSS Removal (%)	80.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (Gal)	
Peak Conveyed Flow Rate (CFS)	
Water Quality Flow Rate (CFS)	

Up Stream Storage	
Storage (ac-ft)	Discharge (cfs)
0.000	0.000

Up Stream Flow Diversion	
Max. Flow to Stormceptor (cfs)	

Particle Size Distribution (PSD)
The selected PSD defines TSS removal

OK-110

Particle Diameter (microns)	Distribution %	Specific Gravity
1.0	0.0	2.65
53.0	3.0	2.65
75.0	15.0	2.65
88.0	25.0	2.65
106.0	41.0	2.65
125.0	15.0	2.65
150.0	1.0	2.65
212.0	0.0	2.65

Notes

• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

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https://www.conteches.com/technical-guides/search?filter=1WBC0O5EYX

Brief Stormceptor Sizing Report - WQI #14

Project Information & Location			
Project Name	Pond Street	**Project Number**	694516
City	Ashland	**State/ Province**	Massachusetts
Country	United States of America	**Date**	11/15/2021
Designer Information		**EOR Information (optional)**	
Name	Josh Stackhouse	**Name**	
Company	Contech Engineered Solutions	**Company**	
Phone #	207-219-9110	**Phone #**	
Email	joshua.stackhouse@conteches.com	**Email**	

Stormwater Treatment Recommendation
The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	WQI #14
Target TSS Removal (%)	80
TSS Removal (%) Provided	98
Recommended Stormceptor Model	STC 450i

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 450i	98
STC 900	99
STC 1200	99
STC 1800	99
STC 2400	99
STC 3600	99
STC 4800	100
STC 6000	100
STC 7200	100
STC 11000	100
STC 13000	100
STC 16000	100

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Sizing Details

Drainage Area	
Total Area (acres)	0.05
Imperviousness %	100.0

Rainfall	
Station Name	BOSTON WSFO AP
State/Province	Massachusetts
Station ID #	0770
Years of Records	58
Latitude	42°21'38"N
Longitude	71°0'38"W

Water Quality Objective	
TSS Removal (%)	80.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (Gal)	
Peak Conveyed Flow Rate (CFS)	
Water Quality Flow Rate (CFS)	

Up Stream Storage	
Storage (ac-ft)	Discharge (cfs)
0.000	0.000

Up Stream Flow Diversion	
Max. Flow to Stormceptor (cfs)	

Particle Size Distribution (PSD)
The selected PSD defines TSS removal

OK-110

Particle Diameter (microns)	Distribution %	Specific Gravity
1.0	0.0	2.65
53.0	3.0	2.65
75.0	15.0	2.65
88.0	25.0	2.65
106.0	41.0	2.65
125.0	15.0	2.65
150.0	1.0	2.65
212.0	0.0	2.65

Notes

• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

For Stormceptor Specifications and Drawings Please Visit:
https://www.conteches.com/technical-guides/search?filter=1WBC0O5EYX

Brief Stormceptor Sizing Report - WQI #12

Project Information & Location			
Project Name	Pond Street	**Project Number**	694516
City	Ashland	**State/ Province**	Massachusetts
Country	United States of America	**Date**	11/15/2021
Designer Information		**EOR Information (optional)**	
Name	Josh Stackhouse	**Name**	
Company	Contech Engineered Solutions	**Company**	
Phone #	207-219-9110	**Phone #**	
Email	joshua.stackhouse@conteches.com	**Email**	

Stormwater Treatment Recommendation
The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	WQI #12
Target TSS Removal (%)	80
TSS Removal (%) Provided	96
Recommended Stormceptor Model	STC 450i

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 450i	96
STC 900	98
STC 1200	98
STC 1800	98
STC 2400	99
STC 3600	99
STC 4800	99
STC 6000	99
STC 7200	99
STC 11000	100
STC 13000	100
STC 16000	100

Sizing Details

Drainage Area

Total Area (acres)	0.11
Imperviousness %	100.0

Rainfall

Station Name	BOSTON WSFO AP
State/Province	Massachusetts
Station ID #	0770
Years of Records	58
Latitude	42°21'38"N
Longitude	71°0'38"W

Water Quality Objective

TSS Removal (%)	80.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (Gal)	
Peak Conveyed Flow Rate (CFS)	
Water Quality Flow Rate (CFS)	

Up Stream Storage

Storage (ac-ft)	Discharge (cfs)
0.000	0.000

Up Stream Flow Diversion

Max. Flow to Stormceptor (cfs)	

Particle Size Distribution (PSD)
The selected PSD defines TSS removal

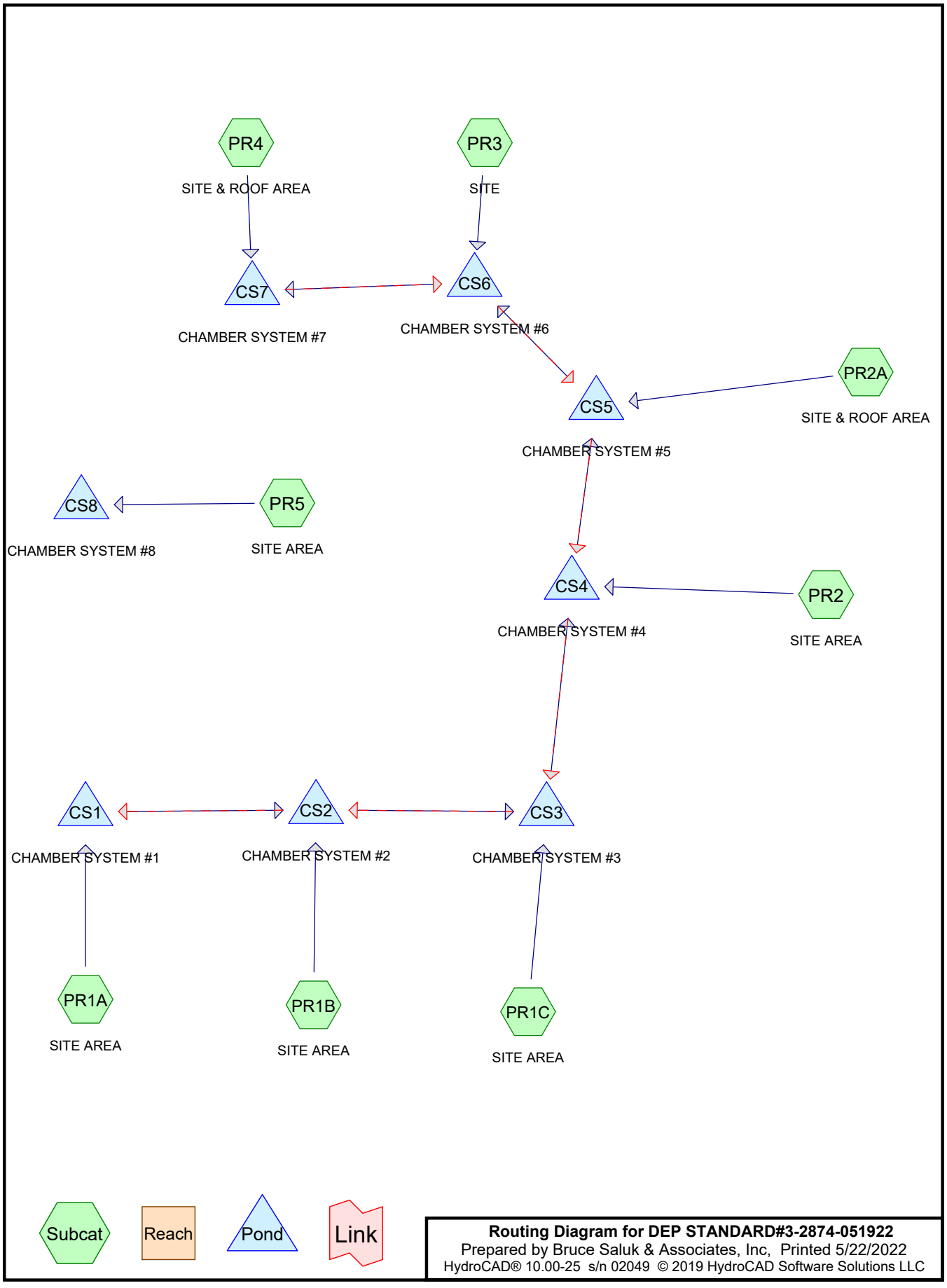
OK-110

Particle Diameter (microns)	Distribution %	Specific Gravity
1.0	0.0	2.65
53.0	3.0	2.65
75.0	15.0	2.65
88.0	25.0	2.65
106.0	41.0	2.65
125.0	15.0	2.65
150.0	1.0	2.65
212.0	0.0	2.65

Notes

• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

For Stormceptor Specifications and Drawings Please Visit:
https://www.conteches.com/technical-guides/search?filter=1WBC0O5EYX



Routing Diagram for DEP STANDARD#3-2874-051922
Prepared by Bruce Saluk & Associates, Inc, Printed 5/22/2022

Summary for Subcatchment PR1A: SITE AREA

Runoff = 0.08 cfs @ 12.08 hrs, Volume= 130 cf, Depth> 0.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 11.00-13.00 hrs, dt= 0.01 hrs
Type III 24-hr STD #3 Rainfall=1.32"

	Area (ac)	CN	Description
*	0.130	98	Impervious Area
	0.060	61	>75% Grass cover, Good, HSG B
	0.190	86	Weighted Average
	0.060		31.58% Pervious Area
	0.130		68.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment PR1B: SITE AREA

Runoff = 0.10 cfs @ 12.09 hrs, Volume= 159 cf, Depth> 0.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 11.00-13.00 hrs, dt= 0.01 hrs
Type III 24-hr STD #3 Rainfall=1.32"

	Area (ac)	CN	Description
*	0.210	98	Impervious Area
	0.140	61	>75% Grass cover, Good, HSG B
	0.350	83	Weighted Average
	0.140		40.00% Pervious Area
	0.210		60.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment PR1C: SITE AREA

Runoff = 0.03 cfs @ 12.09 hrs, Volume= 55 cf, Depth> 0.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 11.00-13.00 hrs, dt= 0.01 hrs
Type III 24-hr STD #3 Rainfall=1.32"

	Area (ac)	CN	Description
*	0.080	98	Impervious Area
	0.060	61	>75% Grass cover, Good, HSG B
	0.140	82	Weighted Average
	0.060		42.86% Pervious Area
	0.080		57.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment PR2: SITE AREA

Runoff = 0.22 cfs @ 12.08 hrs, Volume= 375 cf, Depth> 0.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 11.00-13.00 hrs, dt= 0.01 hrs
Type III 24-hr STD #3 Rainfall=1.32"

	Area (ac)	CN	Description
*	0.250	98	Impervious Area
	0.060	61	>75% Grass cover, Good, HSG B
	0.310	91	Weighted Average
	0.060		19.35% Pervious Area
	0.250		80.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment PR2A: SITE & ROOF AREA

Runoff = 0.90 cfs @ 12.07 hrs, Volume= 1,550 cf, Depth> 0.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 11.00-13.00 hrs, dt= 0.01 hrs
Type III 24-hr STD #3 Rainfall=1.32"

	Area (ac)	CN	Description
*	0.250	98	Impervious Area
	0.070	61	>75% Grass cover, Good, HSG B
*	0.560	98	Roof
	0.880	95	Weighted Average
	0.070		7.95% Pervious Area
	0.810		92.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment PR3: SITE

Runoff = 0.02 cfs @ 12.28 hrs, Volume= 42 cf, Depth> 0.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 11.00-13.00 hrs, dt= 0.01 hrs
Type III 24-hr STD #3 Rainfall=1.32"

	Area (ac)	CN	Description
*	0.130	98	Impervious Area
	0.200	61	>75% Grass cover, Good, HSG B
	0.330	76	Weighted Average
	0.200		60.61% Pervious Area
	0.130		39.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment PR4: SITE & ROOF AREA

Runoff = 0.53 cfs @ 12.08 hrs, Volume= 876 cf, Depth> 0.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 11.00-13.00 hrs, dt= 0.01 hrs
Type III 24-hr STD #3 Rainfall=1.32"

	Area (ac)	CN	Description
*	0.390	98	Impervious Area
	0.260	61	>75% Grass cover, Good, HSG B
*	0.350	98	Roof
	1.000	88	Weighted Average
	0.260		26.00% Pervious Area
	0.740		74.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment PR5: SITE AREA

Runoff = 0.23 cfs @ 12.08 hrs, Volume= 397 cf, Depth> 0.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 11.00-13.00 hrs, dt= 0.01 hrs
Type III 24-hr STD #3 Rainfall=1.32"

	Area (ac)	CN	Description
*	0.230	98	Impervious Area
	0.040	61	>75% Grass cover, Good, HSG B
	0.270	93	Weighted Average
	0.040		14.81% Pervious Area
	0.230		85.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Pond CS1: CHAMBER SYSTEM #1

Inflow	=	0.08 cfs @	12.08 hrs,	Volume=	130 cf
Outflow	=	0.16 cfs @	11.01 hrs,	Volume=	568 cf, Atten= 0%, Lag= 0.0 min
Discarded	=	0.16 cfs @	11.01 hrs,	Volume=	568 cf
Primary	=	0.00 cfs @	11.00 hrs,	Volume=	0 cf

Routing by Sim-Route method w/Net Flows, Time Span= 11.00-13.00 hrs, dt= 0.01 hrs
Peak Elev= 254.61' @ 12.09 hrs Surf.Area= 816 sf Storage= 3 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	254.60'	648 cf	**12.00'W x 68.00'L x 2.80'H Prismatoid** 2,285 cf Overall - 665 cf Embedded = 1,619 cf x 40.0% Voids
#2	255.10'	663 cf	**Cultec R-180** x 30 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 3 rows
#3	255.10'	2 cf	**Cultec HVLV FC-24** x 4 Inside #1 Effective Size= 15.3"W x 12.0"H => 0.91 sf x 0.50'L = 0.5 cf Overall Size= 16.0"W x 12.0"H x 2.02'L with 1.52' Overlap 4 Chambers in 3 Rows
#4	255.10'	57 cf	**12.0" Round Pipe Storage** x 3 -Impervious L= 24.0' S= 0.0200 '/'
#5	255.10'	14 cf	**10.0" Round Pipe Storage**-Impervious L= 25.0' S= 0.0200 '/'
#6	255.50'	63 cf	**4.00'D x 5.00'H Vertical Cone/Cylinder**-Impervious
		1,446 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	254.60'	**8.270 in/hr Exfiltration over Horizontal area**
#2	Primary	255.10'	**12.0" Vert. Orifice/Grate X 2.00** C= 0.600
#3	Primary	258.60'	**2.0" x 2.0" Horiz. Orifice/Grate X 6.00 columns** X 6 rows C= 0.600 in 24.0" x 24.0" Grate (25% open area) Limited to weir flow at low heads

Discarded OutFlow Max=0.16 cfs @ 11.01 hrs HW=254.60' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.16 cfs)

Primary OutFlow Max=0.00 cfs @ 11.00 hrs HW=254.60' TW=254.60' (Dynamic Tailwater)
├**2=Orifice/Grate** (Controls 0.00 cfs)
└**3=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond CS2: CHAMBER SYSTEM #2

Inflow	=	0.10 cfs @	12.09 hrs, Volume=	159 cf
Outflow	=	0.10 cfs @	12.10 hrs, Volume=	159 cf, Atten= 0%, Lag= 0.3 min
Discarded	=	0.10 cfs @	12.10 hrs, Volume=	159 cf
Primary	=	0.00 cfs @	11.00 hrs, Volume=	0 cf
Secondary	=	0.00 cfs @	11.00 hrs, Volume=	0 cf

Routing by Sim-Route method w/Net Flows, Time Span= 11.00-13.00 hrs, dt= 0.01 hrs
Peak Elev= 254.60' @ 12.10 hrs Surf.Area= 1,584 sf Storage= 2 cf

Plug-Flow detention time= 0.3 min calculated for 158 cf (100% of inflow)
Center-of-Mass det. time= 0.4 min (737.8 - 737.4)

Volume	Invert	Avail.Storage	Storage Description
#1	254.60'	1,244 cf	**16.00'W x 99.00'L x 2.80'H Prismatoid** 4,435 cf Overall - 1,324 cf Embedded = 3,111 cf x 40.0% Voids
#2	255.10'	1,320 cf	**Cultec R-180** x 60 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 4 rows
#3	255.10'	4 cf	**Cultec HVLV FC-24** x 9 Inside #1 Effective Size= 15.3"W x 12.0"H => 0.91 sf x 0.50'L = 0.5 cf Overall Size= 16.0"W x 12.0"H x 2.02'L with 1.52' Overlap 9 Chambers in 4 Rows
#4	255.10'	57 cf	**12.0" Round Pipe Storage** x 3 -Impervious L= 24.0' S= 0.0200 '/'
#5	255.10'	38 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder**-Impervious
#6	255.10'	85 cf	**12.0" Round Pipe Storage**-Impervious L= 108.0' S= 0.0200 '/'
		2,748 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600
#2	Discarded	254.60'	**8.270 in/hr Exfiltration over Horizontal area** Phase-In= 0.01'
#3	Secondary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.10 cfs @ 12.10 hrs HW=254.60' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=0.00 cfs @ 11.00 hrs HW=254.60' TW=254.60' (Dynamic Tailwater)
↑—**1=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 11.00 hrs HW=254.60' TW=254.60' (Dynamic Tailwater)
↑—**3=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond CS3: CHAMBER SYSTEM #3

Inflow	=	0.03 cfs @	12.09 hrs, Volume=	55 cf
Outflow	=	0.03 cfs @	12.10 hrs, Volume=	55 cf, Atten= 0%, Lag= 0.3 min
Discarded	=	0.03 cfs @	12.10 hrs, Volume=	55 cf
Primary	=	0.00 cfs @	11.00 hrs, Volume=	0 cf
Secondary	=	0.00 cfs @	11.00 hrs, Volume=	0 cf

Routing by Sim-Route method w/Net Flows, Time Span= 11.00-13.00 hrs, dt= 0.01 hrs
Peak Elev= 254.60' @ 12.10 hrs Surf.Area= 1,188 sf Storage= 1 cf

Plug-Flow detention time= 0.3 min calculated for 54 cf (100% of inflow)
Center-of-Mass det. time= 0.4 min (738.9 - 738.5)

Volume	Invert	Avail.Storage	Storage Description
#1	254.60'	933 cf	**12.00'W x 99.00'L x 2.80'H Prismatoid** 3,326 cf Overall - 993 cf Embedded = 2,334 cf x 40.0% Voids
#2	255.10'	990 cf	**Cultec R-180** x 45 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 3 rows
#3	255.10'	3 cf	**Cultec HVLV FC-24** x 6 Inside #1 Effective Size= 15.3"W x 12.0"H => 0.91 sf x 0.50'L = 0.5 cf Overall Size= 16.0"W x 12.0"H x 2.02'L with 1.52' Overlap 6 Chambers in 3 Rows
#4	255.10'	57 cf	**12.0" Round Pipe Storage** x 3 -Impervious L= 24.0' S= 0.0200 '/'
#5	255.10'	151 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder** x 4 -Impervious
#6	255.10'	5 cf	**10.0" Round Pipe Storage**-Impervious L= 10.0' S= 0.0200 '/'
		2,139 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600
#2	Discarded	254.60'	**8.270 in/hr Exfiltration over Horizontal area** Phase-In= 0.01'
#3	Secondary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.03 cfs @ 12.10 hrs HW=254.60' (Free Discharge)
↑└**2=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 11.00 hrs HW=254.60' TW=254.60' (Dynamic Tailwater)
↑└**1=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 11.00 hrs HW=254.60' TW=254.60' (Dynamic Tailwater)
↑└**3=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond CS4: CHAMBER SYSTEM #4

Inflow	=	0.22 cfs @	12.08 hrs, Volume=	374 cf
Outflow	=	0.22 cfs @	12.08 hrs, Volume=	375 cf, Atten= 0%, Lag= 0.3 min
Discarded	=	0.22 cfs @	12.08 hrs, Volume=	375 cf
Primary	=	0.00 cfs @	11.00 hrs, Volume=	0 cf
Secondary	=	0.00 cfs @	11.00 hrs, Volume=	0 cf

Routing by Sim-Route method w/Net Flows, Time Span= 11.00-13.00 hrs, dt= 0.01 hrs
Peak Elev= 254.60' @ 12.08 hrs Surf.Area= 2,375 sf Storage= 5 cf

Plug-Flow detention time= 0.3 min calculated for 373 cf (100% of inflow)
Center-of-Mass det. time= 0.4 min (729.3 - 729.0)

Volume	Invert	Avail.Storage	Storage Description
#1	254.60'	1,967 cf	**25.00'W x 95.00'L x 2.80'H Prismatoid** 6,650 cf Overall - 1,733 cf Embedded = 4,917 cf x 40.0% Voids
#2	255.10'	1,724 cf	**Cultec R-150XLHD** x 63 Inside #1 Effective Size= 29.8"W x 18.0"H => 2.65 sf x 10.25'L = 27.2 cf Overall Size= 33.0"W x 18.5"H x 11.00'L with 0.75' Overlap Row Length Adjustment= +0.75' x 2.65 sf x 7 rows
#3	255.10'	8 cf	**Cultec R-150XLHD-FC-24** x 18 Inside #1 Effective Size= 15.3"W x 12.0"H => 0.91 sf x 0.50'L = 0.5 cf Overall Size= 16.0"W x 12.0"H x 2.02'L with 1.52' Overlap 18 Chambers in 7 Rows
#4	255.10'	82 cf	**10.0" Round Pipe Storage**-Impervious L= 150.0' S= 0.0200 '/'
#5	255.10'	151 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder** x 4 -Impervious
		3,932 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	255.10'	**12.0" Vert. Orifice/Grate X 5.00** C= 0.600
#2	Discarded	254.60'	**8.270 in/hr Exfiltration over Horizontal area** Phase-In= 0.01'
#3	Secondary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.22 cfs @ 12.08 hrs HW=254.60' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.22 cfs)

Primary OutFlow Max=0.00 cfs @ 11.00 hrs HW=254.60' TW=254.60' (Dynamic Tailwater)
↑**1=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 11.00 hrs HW=254.60' TW=254.60' (Dynamic Tailwater)
↑**3=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond CS5: CHAMBER SYSTEM #5

Inflow	=	0.90 cfs @	12.07 hrs, Volume=	1,547 cf
Outflow	=	0.80 cfs @	12.05 hrs, Volume=	1,548 cf, Atten= 11%, Lag= 0.0 min
Discarded	=	0.80 cfs @	12.05 hrs, Volume=	1,548 cf
Primary	=	0.00 cfs @	11.00 hrs, Volume=	0 cf
Secondary	=	0.00 cfs @	11.00 hrs, Volume=	0 cf

Routing by Sim-Route method w/Net Flows, Time Span= 11.00-13.00 hrs, dt= 0.01 hrs
Peak Elev= 254.62' @ 12.12 hrs Surf.Area= 4,175 sf Storage= 35 cf

Plug-Flow detention time= 0.4 min calculated for 1,540 cf (100% of inflow)
Center-of-Mass det. time= 0.4 min (726.5 - 726.1)

Volume	Invert	Avail.Storage	Storage Description
#1	254.60'	3,450 cf	**25.00'W x 167.00'L x 2.80'H Prismatoid** 11,690 cf Overall - 3,066 cf Embedded = 8,624 cf x 40.0% Voids
#2	255.10'	3,055 cf	**Cultec R-150XLHD** x 112 Inside #1 Effective Size= 29.8"W x 18.0"H => 2.65 sf x 10.25'L = 27.2 cf Overall Size= 33.0"W x 18.5"H x 11.00'L with 0.75' Overlap Row Length Adjustment= +0.75' x 2.65 sf x 7 rows
#3	255.10'	11 cf	**Cultec R-150XLHD-FC-24** x 24 Inside #1 Effective Size= 15.3"W x 12.0"H => 0.91 sf x 0.50'L = 0.5 cf Overall Size= 16.0"W x 12.0"H x 2.02'L with 1.52' Overlap 24 Chambers in 7 Rows
#4	255.10'	82 cf	**10.0" Round Pipe Storage**-Impervious L= 150.0' S= 0.0200 '/'
#5	255.10'	151 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder** x 4 -Impervious
		6,748 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600
#2	Discarded	254.60'	**8.270 in/hr Exfiltration over Horizontal area** Phase-In= 0.01'
#3	Secondary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.80 cfs @ 12.05 hrs HW=254.61' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.80 cfs)

Primary OutFlow Max=0.00 cfs @ 11.00 hrs HW=254.60' TW=254.60' (Dynamic Tailwater)
↑—**1=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 11.00 hrs HW=254.60' TW=254.60' (Dynamic Tailwater)
↑—**3=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond CS6: CHAMBER SYSTEM #6

Inflow	=	0.02 cfs @	12.28 hrs, Volume=	42 cf
Outflow	=	0.02 cfs @	12.28 hrs, Volume=	42 cf, Atten= 0%, Lag= 0.3 min
Discarded	=	0.02 cfs @	12.28 hrs, Volume=	42 cf
Primary	=	0.00 cfs @	11.00 hrs, Volume=	0 cf
Secondary	=	0.00 cfs @	11.00 hrs, Volume=	0 cf

Routing by Sim-Route method w/Net Flows, Time Span= 11.00-13.00 hrs, dt= 0.01 hrs
Peak Elev= 254.60' @ 12.28 hrs Surf.Area= 976 sf Storage= 0 cf

Plug-Flow detention time= 0.3 min calculated for 42 cf (100% of inflow)
Center-of-Mass det. time= 0.4 min (746.5 - 746.1)

Volume	Invert	Avail.Storage	Storage Description
#1	254.60'	772 cf	**16.00'W x 61.00'L x 2.80'H Prismatoid** 2,733 cf Overall - 802 cf Embedded = 1,931 cf x 40.0% Voids
#2	255.10'	798 cf	**Cultec R-180** x 36 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 4 rows
#3	255.10'	4 cf	**Cultec HVLV FC-24** x 9 Inside #1 Effective Size= 15.3"W x 12.0"H => 0.91 sf x 0.50'L = 0.5 cf Overall Size= 16.0"W x 12.0"H x 2.02'L with 1.52' Overlap 9 Chambers in 4 Rows
#4	255.10'	47 cf	**12.0" Round Pipe Storage**-Impervious L= 60.0' S= 0.0200 '/'
#5	255.10'	38 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder**-Impervious
		1,659 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600
#2	Discarded	254.60'	**8.270 in/hr Exfiltration over Horizontal area** Phase-In= 0.01'
#3	Secondary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.02 cfs @ 12.28 hrs HW=254.60' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 11.00 hrs HW=254.60' TW=253.30' (Dynamic Tailwater)
↑—**1=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 11.00 hrs HW=254.60' TW=254.60' (Dynamic Tailwater)
↑—**3=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond CS7: CHAMBER SYSTEM #7

Inflow	=	0.53 cfs @	12.08 hrs, Volume=	874 cf	
Outflow	=	0.49 cfs @	12.06 hrs, Volume=	875 cf,	Atten= 8%, Lag= 0.0 min
Discarded	=	0.49 cfs @	12.06 hrs, Volume=	875 cf	
Primary	=	0.00 cfs @	11.00 hrs, Volume=	0 cf	
Secondary	=	0.00 cfs @	11.00 hrs, Volume=	0 cf	

Routing by Sim-Route method w/Net Flows, Time Span= 11.00-13.00 hrs, dt= 0.01 hrs
Peak Elev= 253.32' @ 12.12 hrs Surf.Area= 2,544 sf Storage= 17 cf

Plug-Flow detention time= 0.4 min calculated for 870 cf (100% of inflow)
Center-of-Mass det. time= 0.4 min (732.0 - 731.6)

Volume	Invert	Avail.Storage	Storage Description
#1	253.30'	2,185 cf	**12.00'W x 212.00'L x 3.00'H Prismatoid** 7,632 cf Overall - 2,169 cf Embedded = 5,463 cf x 40.0% Voids
#2	253.80'	2,166 cf	**Cultec R-180** x 99 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 3 rows
#3	253.80'	4 cf	**Cultec HVLV FC-24** x 8 Inside #1 Effective Size= 15.3"W x 12.0"H => 0.91 sf x 0.50'L = 0.5 cf Overall Size= 16.0"W x 12.0"H x 2.02'L with 1.52' Overlap 8 Chambers in 3 Rows
#4	253.80'	24 cf	**12.0" Round Pipe Storage**-Impervious L= 30.0' S= 0.0200 '/'
#5	253.80'	75 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder** x 2 -Impervious
#6	253.80'	74 cf	**10.0" Round Pipe Storage**-Impervious L= 135.0' S= 0.0200 '/'
		4,527 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	253.25'	**18.0" Round RCP_Round 18"** L= 47.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 253.25' / 249.30' S= 0.0840 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf
#2	Device 1	253.80'	**12.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	255.60'	**4.2' long x 1.50' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s) 2.2' Crest Height
#4	Device 2	253.55'	**18.0" Vert. Orifice/Grate** C= 0.600
#5	Device 4	253.80'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600
#6	Discarded	253.30'	**8.270 in/hr Exfiltration over Horizontal area** Phase-In= 0.01'
#7	Secondary	253.80'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.49 cfs @ 12.06 hrs HW=253.31' (Free Discharge)
└**6=Exfiltration** (Exfiltration Controls 0.49 cfs)

Primary OutFlow Max=0.00 cfs @ 11.00 hrs HW=253.30' (Free Discharge)
└**1=RCP_Round 18"** (Passes 0.00 cfs of 0.01 cfs potential flow)
  └**2=Orifice/Grate** (Controls 0.00 cfs)
    └**4=Orifice/Grate** (Controls 0.00 cfs)
      └**5=Orifice/Grate** (Controls 0.00 cfs)
  └**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 11.00 hrs HW=253.30' TW=254.60' (Dynamic Tailwater)
└**7=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond CS8: CHAMBER SYSTEM #8

Inflow Area = 11,761 sf, 85.19% Impervious, Inflow Depth > 0.40" for STD #3 event
Inflow = 0.23 cfs @ 12.08 hrs, Volume= 396 cf
Outflow = 0.23 cfs @ 12.08 hrs, Volume= 396 cf, Atten= 0%, Lag= 0.3 min
Discarded = 0.23 cfs @ 12.08 hrs, Volume= 396 cf
Primary = 0.00 cfs @ 11.00 hrs, Volume= 0 cf

Routing by Sim-Route method w/Net Flows, Time Span= 11.00-13.00 hrs, dt= 0.01 hrs
Peak Elev= 254.11' @ 12.08 hrs Surf.Area= 1,320 sf Storage= 5 cf

Plug-Flow detention time= 0.3 min calculated for 395 cf (100% of inflow)
Center-of-Mass det. time= 0.4 min (727.9 - 727.5)

Volume	Invert	Avail.Storage	Storage Description
#1	254.10'	890 cf	**12.00'W x 110.00'L x 2.10'H Prismatoid** 2,772 cf Overall - 548 cf Embedded = 2,224 cf x 40.0% Voids
#2	254.60'	547 cf	**Cultec C-100HD** x 39 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap Row Length Adjustment= +0.50' x 1.86 sf x 3 rows
#3	254.60'	0 cf	**Cultec C-100-SFCx2** x 4 Inside #1 Effective Size= 10.1"W x 7.6"H => 0.29 sf x 0.33'L = 0.1 cf Overall Size= 12.0"W x 7.6"H x 1.64'L with 1.31' Overlap 4 Chambers in 3 Rows
#4	254.60'	28 cf	**8.0" Round Pipe Storage**-Impervious L= 80.0' S= 0.0100 '/'
#5	254.60'	75 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder** x 2 -Impervious
		1,541 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	254.50'	**8.0" Vert. Orifice/Grate** C= 0.600
#2	Discarded	254.10'	**8.270 in/hr Exfiltration over Horizontal area** Phase-In= 0.01'

Discarded OutFlow Max=0.23 cfs @ 12.08 hrs HW=254.11' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.23 cfs)

Primary OutFlow Max=0.00 cfs @ 11.00 hrs HW=254.10' (Free Discharge)
↑—**1=Orifice/Grate** (Controls 0.00 cfs)

APPENDIX B:

Long Term Pollution Prevention, Operation and Maintenance Plan

LONG TERM POLLUTION PREVENTION, OPERATION AND MAINTENANCE PLAN

STANDARDS 4-6 & 9

For

4-Story Apartment Building

- Pond St & Converse Way, Ashland MA-

The following items are intended as a guideline for continued maintenance of the storm drain system after construction. There may be other measures that should be applied to certain drainage appurtenances not mentioned herein. Therefore, the current owner, followed by the future owners of the Stormwater system should be updating this plan on an as needed basis.

Responsible Party for the Operation, Maintenance & Financing repairs

Initially, and until the Project site is turned over to another ownership, the responsible party will be:

The responsible party is the property owner.

Trask Inc.
337 Turnpike RD, Suite 201
Southborough, MA
Contact: Ben Stevens Tel: 508-485-0077

Inspection and Maintenance Requirements

The responsible party shall retain and pay for inspectional services by a designated person that is qualified and approved to perform such inspectional services. Training for individual(s) involved with implementing the Long-term Pollution Prevention Plan shall be provided by the responsible party. Said party shall also pay the maintenance and repair cost. After each inspection, the inspector shall complete the inspection report forms. These reports shall be kept for future review by Federal, State or Local authorities. The frequency of the inspections shall be as updated to the amended DEP Stormwater Management Regulations, and, in the case of the subsurface Water Quality Structures, according to the O & M schedules recommended by those Manufacturers.

The estimated annual operation & Maintenance Budget for the Stormwater system is $2000. The entity providing maintenance services shall follow confined space entry procedures in accordance with OSHA requirements.

The inspection and maintenance outlined below shall be followed and submitted by the inspector to the owner and the designated Municipal Department.

Erosion
Significant erosion along slopes shall be protected with engineered soil reinforcement, jute mesh, ground cover and/or erosion control, as approved.

Water Quality Structures
There are twelve(12) TSS removal structures proposed and designated on the drainage plans. These Water quality structures are CDS units manufactured by Contech shall be inspected twice per year(spring & fall). Following the first year, inspection sequence shall be performed as recommended by the inspector, but not less than once per year. Removal of sediment shall be required when the sediment reaches 75% of the capacity of the sump. Measurements shall be taken at each inspection and recorded in the Inspection & Maintenance log. Removal of the sediment from the sump area and disposal shall be in accordance with local, State and Federal regulations. Sediment removal shall be performed by a certified CDS unit maintenance provider using a Vac Truck, or equal. The procedures and Inspection & maintenance shall follow the manual entitled *" CDS Inspection & Maintenance Guide"*, by Contech at wwww.conteches.com

Site Drain – Subsurface Chamber Systems
Inspection and maintenance of the chamber systems shall be in accordance with the proprietary guidelines, as follows:

Inspection and maintenance of the chamber system shall be in accordance with the proprietary guidelines entitled *" Contactor & Recharger Stormwater Chamber- operation and maintenance guidelines."* www.cultec.com Access to the subsurface chambers shall be from the inspection ports provided. If inspection shows that any of the chamber systems are not fully draining within 72 hours following a storm event, the responsible party shall retain a qualified engineer to assess the reason for infiltration failure and to recommend corrective action for restoring the infiltration rate. The responsible party shall implement corrective action based on this evaluation.

Bi-annual inspection of the chamber system shall be from the inspection port provided.

Catch Basins
In accordance with DEP Stormwater Manual, catch basins shall be inspected 4 times per year and cleaned of debris when the depth of sediment reaches 2FT(50 % of the sump depth). Disposal shall comply with local, State and Federal regulations.

Outlet Control Structures
There is one(1) outlet control structure for Chamber system shown on the drainage plans. This structure should be inspected once per year and cleaned of debris at the outlet orifice.

Snow removal, Deicing Treatment & Storage Operations

Snow disposal, if required, shall be in accordance with Mass DEP Guideline No. BRPG01-01 requirements. Salt application shall be minimal and shall only be used where necessary. The use of sodium Chloride (NaCl) is prohibited. Storage of Roadway deicing salt shall be offsite. Snow quantities in excess of the onsite storage capacity shall be removed from the site by the snow removal contractor.

Good House Keeping Practices & Illicit Discharge Prevention

Inspections of the entire site and shall identify and report to the owner any erosion, pollution, and accumulation of any unsuitable material on the site. The inspector shall note and report any sign of an illicit discharge on the property. The owner shall assign qualified workers to fulfill recommendations by the inspector for cleanup and illicit discharge elimination.

All hazardous waste materials discovered will be disposed of in the manner specified by local and state regulation. The owner will be responsible for seeing that these procedures are followed.

Pavement Sweeping

Pavement shall be swept every spring at the frequency required to remove sand and other debris.

Accidental Spill Containment

The drainage system provides sufficient capacity to isolate and contain a large spill within the stormwater system for an accidental spill. The company providing the cleanup services for the spill shall follow public safety practices and cordon off the spill containment work zone for the protection of the public. Regardless of the size, spills of toxic or hazardous material will be reported to the appropriate State or local government agency. The inspector shall report all inspections and make recommendations to the owner for actions and maintenance deemed necessary by the inspector.

The above recommendations are applicable to project completion with 100% established vegetative cover and are not intended for construction progress measures.

Storage of Materials and Waste

Long term storage of waste or trash that is harmful to the groundwater and wetland resources is prohibited. Such waste shall be immediately removed from the property by a licensed contractor. Weekly garbage removal shall be by a commercial trash removal company.

Vehicle Washing Control

Vehicle washing on this property is prohibited. Vehicle washing shall be at commercial car washing facility that already has environmental controls in place.

Fertilizers, Herbicides, Pesticides and Fungicides

It is recommended that the common application of fertilizers, herbicides, pesticides and fungicides be restricted, and only used on a limited basis in the approved application zone as follows: Chemical additives applied to the ground cover and plants within 20 FT of the Wetlands are prohibited. Application for such chemicals shall only be used on a limited basis beyond said Wetland setback zone.
Use of chemicals in these areas shall be applied in a manner that prevents the chemical from being washed down gradient of the application zone, e.g., fertilizer shall be worked into the soil to prevent washout. Storage of these chemicals shall be in the product containers in a safe dry enclosure, such as a locked shed, or offsite landscape company's storage facility.

INSPECTION REPORT No.____
For
4-Story Apartment Building
-501 Pond ST, Ashland MA-

INSPECTION DATE:

INSPECTOR:

INSPECTION DATE:
INSPECTOR:

1) CATCH BASINS
The inspector shall refer to the narrative on previous pages.

COMMENTS & RECOMMENDATIONS:
_____
_____
_____
_____
_____
_____
_____
_____

MEASUREMENTS:
_____

SIGNS OF ILLICIT DISCHARGES: YES NO
CLEANING REQUIRED: YES NO
DEPTH OF SEDIMENT_____
DATE CLEANED: _____
PERFORMED BY: _____

2) EROSION

The inspector shall refer to the narrative on previous pages.

COMMENTS & RECOMMENDATIONS:

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

MEASUREMENTS:

_____

SIGNS OF EROSION: YES NO
MAINTENANCE REQUIRED: YES NO
DATE MAINTAINED: _____
PERFORMED BY: _____

3) WATER QUALITY STRUCTURES:

The inspector shall refer to the narrative on previous pages.
The procedures and Inspection & maintenance shall follow the manual entitled " CDS Inspection & Maintenance Guide," by Contech at wwww.conteches.com
Inspection frequency shall be 2 times per year for the first 2 years following construction, then no less than once per year thereafter, or as recommended by the manufacturer, whichever occurs more often.

COMMENTS & RECOMMENDATIONS: _____
_____
_____
_____
_____
_____
_____

OBSERVATIONS: _____

CLEANING REQUIRED: YES NO
DATE CLEANED: _____

PERFORMED BY: _____

4) SUBSURFACE RECHARGE CHAMBERS

Refer to narrative on page the previous pages.
Inspection frequency: twice per year

REFER TO THE GUIDELINES REFERENCE ON PAGE 2 FOR INSPECTION & MAINTENANCE.

COMMENTS & RECOMMENDATIONS:

_____
_____
_____
_____
_____
_____
_____

MEASUREMENTS: _____

INSPECTION PORTS ARE ACCESSIBLE:	YES	NO
CLEANING REQUIRED:	YES	NO
WATER IN THE CHAMBER IS PRESENT	YES	NO
DID THE CHAMBERS FULLY DRAIN? WITHIN 72 HRS SINCE THE LAST STORM	YES	NO

MAINTENANCE REQUIRED: _____

PERFORMED BY: _____

5) GOOD HOUSE KEEPING & PREVENTION OF ILLICIT DISCHARGES:

The inspector shall refer to the narrative on previous pages.

COMMENTS & RECOMMENDATIONS:

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

MEASUREMENTS: _____

SIGNS OF ILLICIT DISCHARGE: YES NO
CLEANING REQUIRED: YES NO
DATE MAINTAINED: _____

PERFORMED BY: _____

6) PAVEMENT SWEEPING:

The inspector shall refer to the narrative on previous pages.

COMMENTS & RECOMMENDATIONS:

_____
_____
_____
_____
_____
_____
_____
_____
_____

MEASUREMENTS: _____

SWEEPING REQUIRED: YES NO
DATE SWEPT: _____

PERFORMED BY: _____

APPENDIX C:

Construction Period Operation & Maintenance Plan

Construction Pollution Prevention & Erosion/Sedimentation Control Plan

Proposed 4-Story Apartment Building

- Pond St & Converse Way, Ashland MA-
-STANDARD #8-

Purpose:

The following provides the Construction Period Sequencing, Erosion/ Sedimentation measures, Operation, Maintenance & Pollution Prevention in accordance with Standard #8. The contractor is also required to follow the SWPPP inspection and pollution prevention measures, as required under the EPA General Construction Permit.

Narrative of surface water flow through the site and receiving downstream resource areas:

Most of the site flows to a 24" RCP culvert that discharges to an intermittent brook in Holliston. From there it flows south to Jar Brook, a perennial. Jar Brook flows to the Bogastow Brook, which flows to the Charles River at the Millis/ Medfield Town line.

A smaller area on the north side of the property sheds runoff to an infiltration basin located at the north abutting property. Records show all flow that enters this basin recharges into the ground. .

Responsible Party for Compliance to the Construction Pollution Prevention & Erosion/Sedimentation Control Plan:

Trask Inc.
337 Turnpike RD, Suite 201
Southborough, MA
Contact: Ben Stevens Tel: 508-485-0077

Construction Sequencing:

The following is a general construction sequence outline:

1) Set all Erosion Control measures, and anti-tracking berms called for on the approved plan.

2) Provide temporary channels and ditches to divert runoff from the work zone into the sedimentation traps. Provide other temporary sedimentation traps where required.
3) Start earthwork stage: remove and stockpile top and subsoils for future use.
4) Provide grading, infrastructure and building construction and associated work.
5) When the site is fully stabilized, remove erosion control and silt sacks.

Throughout the construction period the contractor shall provide erosion control operation, Maintenance & Pollution Prevention Measures in accordance with Standard #8, outlined below and as required by permitting authorities.

Erosion and Sedimentation Controls:

Structural Practices

Silt Socks & Siltation Fencing
Siltation fencing with wattles to be installed to protect the downstream resource areas and will be maintained throughout the course of construction until the site has been fully stabilized. The contractor shall have additional straw bales, siltation fencing available to address washouts and other emergencies. Additional straw bales and siltation fence shall be stored at the site for quick access and reinforcement of selected sections of the erosion control line where necessary.

Exposed Slopes
On exposed slopes, mechanical cultivation of soils shall include grooves created by dozer treads set perpendicular to the slope direction. On long slopes, runoff shall be directed via swales to temporary sedimentation traps as directed by the construction manager.

Soil Stabilization
Soil stabilization measures shall be implemented immediately after finish grading.

Clearing and grubbing
Soil stripping shall be done to minimize soil tracking and site erosion. The site superintendent shall implement soil striping if the exposed soil is or will soon become eroded or tracked by vehicles. It is recommended that stripping & stockpile of soils be done in stages to minimize the amount overall exposed soils. Soil stabilization measures shall be implemented immediately after finish grading.

Temporary Sedimentation Traps
Construct sedimentation traps downgradient of the work zone. Sedimentation traps shall include a pump system connection to a filter bag, or equal means to filter the stormwater. Provide temporary channels and ditches to divert runoff from the work zone into the sedimentation traps. Provide other temporary sedimentation traps where required.

Provide additional small sedimentation traps intended for short-term use (overnight to several weeks). Typical dimensions for small traps are 5ft x 10ft and 3-5 ft. in height. Temporary sedimentation traps may be used at various locations to control erosion and sediment. They can remain in place until it obstructs construction operations or fills up with deposit, when it can be replaced with another trap. Temporary sedimentation traps can be produced by a natural depression, excavation, or with an impoundment berm. Typical locations for drainage ways include the bottoms of embankments, the lower end of waste or borrow areas, or at the downgrade area of a cut section. Temporary sediment traps may include a pump & filter bag to provide additional removal of excess sediment where applicable.

Dewatering

Excavated areas, trenches and sediment traps that require dewatering shall not be discharged without treatment. On a regular basis, provide slow rate pump down and treatment of the captured storm water in each sedimentation trap. This should also be performed before rainfall events. Slow release and filtration shall be treated by approved means. Acceptable practices will include the use of filtration bags shown on the Detail sheet leaf mulch, stump grindings and/or additional sedimentation traps where water can be collected and recharged into the ground.

Water Quality Structure Grate filters

Install silt sacks in the proposed water quality grates as soon as they are functional. Silt sacks shall be installed and maintained until the site has been fully stabilized.

Drainage swales

Swales will be constructed at various locations throughout the site during construction to divert runoff to the sedimentation traps.

Offsite Vehicle Tracking

Stabilized construction entrances (anti-tracking pad) shall be provided at the project construction entrance. The anti-tracking pad will be 50-feet long by the width of the drive access and will be constructed of 12-inches of 3/4 to 3-inch crushed stone. The removal and stockpiling of topsoil and subsoil in the work zone shall be accomplished as soon as feasible to minimize the amount of cohesive soil exposure to vehicles.

Stabilization Practices

Temporary Stabilization

Topsoil stockpiles and disturbed portions of the site where construction activity ceases for a growing season will be stabilized with temporary seed and mulch . The temporary seed shall be as follows:

New England Erosion Control / Restoration Mix

Application Rate: 35 lbs./acre 1,245 sq. ft./lb.
The New England Erosion Control/Restoration Mix contains a selection of native grasses and wildflowers designed to colonize generally moist, recently disturbed sites where quick growth of vegetation is desired to stabilize the soil surface. This mix is particularly appropriate for detention basins that do not normally hold standing water. The plants in this mix can tolerate infrequent inundation, but no constant flooding. In New England, the best results are obtained with a spring or early fall seeding. Summer and fall seeding can be successful with a light mulching of weed-free straw to conserved moisture. Late fall and winter dormant seeding require a slight increase in the seeding rate. Fertilization is not required unless the soils are particularly infertile. Species include: Switch grass (*Panicum virgatum*), Creeping Red Fescue (*Festuca rubra*), Virginia Wild Rye (*Elymus vierinicus*), Fox Sedge (*Carex vulpinoidea*), Creeping Bentgrass (*Agrostis stolonifera*), Silky Wild Rye (*Elymus villosus*), Nodding Bur-marigold (*Bidens cernua*), Soft Rush (*Juncus effuses*), Grass-leaved Goldenrod (*Solidago graminifolia*), Sensitive fern (*Onoclea sensibilis*), Joe-Pye Weed (*Eupatorium maculatum*), boneset (*Eupatorium perfoliatum*), Flat-top Aster (*Aster umbellatus*), New York Aster (*Aster novi-belgii*), and Blue Vervain (*Verbena hastate*).

Areas of the lot that are to be paved will be temporarily stabilized by installing the subbase until bituminous pavement can be applied.

Other Controls

Waste Disposal

Waste Materials
All waste materials will be collected and stored in metal dumpsters rented from a licensed solid waste management company. The dumpsters will meet all local and state solid waste management regulations. All trash and construction debris from the site will be deposited in the dumpsters. No construction waste will be buried or burned onsite. All personnel will be instructed regarding the correct procedure for waste disposal. The construction site superintendent will be responsible for seeing that these procedures are followed.

Hazardous Waste
All hazardous waste materials will be disposed of in the manner specified by local and state regulation or by the manufacturer. Site personnel will be instructed in these practices and the construction site superintendent will be responsible for seeing that these procedures are followed.

Sanitary Waste
All sanitary waste will be collected from the portable units by a licensed sanitary waste management company, as required by local and state regulation.

Construction Stage Maintenance / Inspection Procedures

Erosion and Sediment Control Inspection and Maintenance Practices

- All control measures will be inspected at least once each week and following any storm event of 0.5 inches or greater

- All measures will be maintained in good working order; if a repair is necessary, it will be initiated within 24 hours of report

- Accumulated sediment will be removed from silt fence when it has reached a depth of 6-inches.

- Silt fencing will be inspected for depth of sediment to check that fabric is securely set along the bottom attached to the fence posts. Inspection shall confirm that the fence posts are firmly set in the ground.

- All sedimentation traps will be inspected for depth of sediment, and accumulated sediment will be removed on a regular basis to allow natural recharge into the ground. Temporary sediment traps can be allowed to fill with sediment, and either excavated and re-used or stabilized. Traps, at all times, shall be maintained with slopes that are 3 to 1 (max.) and collected mud and silt that must be removed when depth reaches 8-inches.

- All diversion dikes and channels will be inspected, and any breaches promptly repaired.

- Temporary and permanent seeding and plantings will be inspected for bare spots, washouts, and healthy growth.

- A Construction Stormwater Maintenance Inspection to be made after each inspection. A copy of the form to be completed by the inspector is attached.

- The site superintendent will select a site worker who will be responsible for inspections, maintenance, and repair activities, and filling out the inspection and maintenance report.

- Personnel selected for inspection and maintenance responsibilities will receive training from the site superintendent. They will be trained in all the inspection and maintenance practices necessary for keeping the erosion and sediment controls used onsite in good working order.

Non-Storm Water Discharges

Uncontaminated non-rainfall related discharges from the site during the construction period may occur from dewatering of excavated trenches. Any non-stormwater discharges shall be directed to the sedimentation traps .

Construction Spill Prevention

Material Management Practices

The following are the material management practices that will be used to reduce the risk of spills or other accidental exposure of materials and substances to stormwater runoff.

Good Housekeeping – The following good housekeeping practices will be followed onsite during the construction project:

- An effort will be made to store only enough product required to do the job
- All materials stored onsite will be stored in a neat, orderly manner in their appropriate containers and if possible under a roof or other enclosure
- Products will be kept in their original containers with the manufacturer's label affixed
- Substances will not be mixed with one another unless recommended by the manufacturer
- Whenever possible, all products will be used up before disposing of the container
- Manufacturer's recommendations for proper use and disposal will be followed
- The site superintendent will inspect daily to ensure proper use and disposal of materials

Hazardous Products – These practices are used to reduce the risks associated with hazardous materials.

- Products will be kept in original containers unless they are not resealable
- Original labels and material safety data will be retained; they contain important product information
- If surplus product must be disposed of manufacturers' or local and state recommended methods for proper disposal will be followed.

Construction Practices for Equipment & Products

Use and storage of motorized vehicles/Machinery

All maintenance, including, but not limited to lubricating, refueling fluid replacement and washing shall be done outside the 100-FT wetland buffer.

Petroleum Products

All onsite vehicles will be monitored for leaks and receive regular preventative maintenance to reduce the chance of leakage. Petroleum products will be stored in tightly sealed containers that are clearly labeled. Any asphalt substances used onsite will be applied according to the manufacturer's recommendations.

Fertilizers

Fertilizers used will be applied only in the minimum amounts recommended by the manufacturer. Once applied, fertilizer will be worked into the soil to limit exposure to stormwater. Storage will be in a covered shed. The contents of any partially used bags of fertilizer will be transferred to a sealable plastic bin to avoid spills.

Paints

All containers will be tightly sealed and stored when not required for use. Excess paint will not be discharged to the stormwater system but will be properly disposed of according to manufacturer's instructions or State and local regulations.

Spill Control Practices

In addition to the good housekeeping and material management practices discussed in the previous sections of this plan, the following practices will be followed for spill prevention and cleanup:

- Manufacturer's recommended methods for spill cleanup will be clearly posted and site personnel will be made aware of the procedures and the location of the information and cleanup supplies.

- Materials and equipment necessary for spill cleanup will be kept in the material storage area onsite. Equipment and materials will include but not be limited to brooms, dust pans, mops, rags, gloves, goggles, kitty litter, sand, sawdust, and plastic and metal trash containers specifically for this purpose.

- All spills will be cleaned up immediately after discovery.

- The spill area will be kept well ventilated, and personnel will wear appropriate protective clothing to prevent injury from contact with a hazardous substance.

- Spills of toxic or hazardous material will be reported to the appropriate State or local government agency, regardless of the size.

- The spill prevention plan will be adjusted to include measures to prevent this type of spill from reoccurring and how to clean up the spill if there is another one. A

description of the spill, what caused it, and the cleanup measures will also be included.

- The site superintendent will be the spill prevention and cleanup coordinator. This individual will designate a site worker who will receive spill prevention and cleanup training. These individuals will each become responsible for a particular phase of prevention and cleanup. The names of responsible spill personnel will be posted in the material storage areas and in the office trailer onsite.

Pre-Blast Survey & Blasting

Ledge blasting practices and other aspects involving material, storage and procedures shall be in conformance with Massachusetts 527 CMR 1.00 regulations and applicable federal regulations.

Federal agencies that regulate explosives include:

• Alcohol, Tobacco, Firearms and Explosives (ATF) – sales and storage
• Department of Transportation (DOT) – transportation
• Occupational Safety and Health Administration (OSHA) –construction use and handling
• Mining Safety and Health Administration (MSHA) – mining use and handling

Record Keeping

The construction trailer shall include, but not limited to the following:

- Copy of NPDES General Construction permit
- Dates of grading, construction activity, and stabilization
- Construction plans
- Signed copy of the SWPPP manual
- Copy of the letter from the EPA notifying you of receipt of your NOI
- Inspection reports prepared by the contractor during construction
- Emergency Response Contact & Telephone list of State & Local authorities
- Construction Pollution Prevention & Erosion/Sedimentation Control Plan

INSPECTION AND MAINTENANCE REPORT FORM
For
Proposed 4-Story Apartment Building
- 501 Pond St, Ashland MA-

TO BE COMPLETED EVERY 7 DAYS AND WITHIN 24-HOURS OF A RAINFALL EVENT OF 0.5 INCHES OR MORE.

INSPECTOR: _____ DATE: _____

INSPECTOR'S JOB TITLE: _____

DAYS SINCE LAST RAINFALL: _____ AMOUNT OF LAST RAINFALL: _____ INCHES

STABILIZATION MEASURES

ACTION ITEM	(Y/N)	CONDITIION	COMMENTS
Any signs of sediment by-passing wattles or siltation fencing			
Is there sufficient storage available in all sedimentation traps for the next 2-inch rainfall			
Are CB's & WQI's protected with Silt-Sacs and has the accumulated silt exceeding 6-inches been removed			
Are erosion control barriers set around all stockpile areas ?			
Has any dirt been tracked onto Public Way			
Are materials that are potential stormwater contaminants stored inside or under cover?			
Is the water quality leaving the site clean			
Has the contractor complied with the applicable requirements of the SWPPP & Construction Pollution Prevention & Erosion/Sedimentation Control Plan			

STABILIZATION
REQUIRED:_____
_____
_____

TO BE PERFORMED BY: ON OR BEFORE:

INSPECTION AND MAINTENANCE REPORT FORM

For
Proposed 4-Story Apartment Building
- 501 Pond St, Ashland MA-

WATTLE / SILT FENCING:

FROM*	TO*	IS LINE STABILIZED?	WASHOUT OR OVERTOPPING?

*- List erosion control section, or if inspection applies to all sections, list ALL.

MAINTENANCE REQUIRED FOR WATTLES/SILTFENCE
LINE:_____
_____
_____
_____
TO BE PERFORMED BY:_____ ON OR BEFORE:_____

INSPECTION AND MAINTENANCE REPORT FORM

For

Proposed 4-Story Apartment Building
- 501 Pond St, Ashland MA-

ANTI-TRACKING PAD

LOCATION	SEDIMENT ON ROAD?	IS THE STONE SILTED-UP?	DOES ALL TRAFFIC USE THE PAD?	CONDITION OF DRAINAGE DIVERSION

MAINTENANCE REQUIRED FOR ANTI-TRACKING PADS:_____
_____
_____
_____
_____
_____

TO BE PERFORMED BY:_____ ON OR BEFORE:_____

INSPECTION AND MAINTENANCE REPORT FORM

For

Proposed 4-Story Apartment Building
- 501 Pond St, Ashland MA-

SEDIMENTATION BASINS / TRAPS

LOCATION	DEPTH OF SEDIMENT	SIGNS OF OVERTOPPING OR WASHOUT?	IS THERE ENOUGH AVAILABLE STORAGE FOR 2-INCH RAINFALL ?	CONDITION / STATUS OF STANDPIPE SAND FILTER, OUTFALL/OUTLET DEVICE/PUMP DOWN TREATMENT SYSTEM

MAINTENANCE REQUIRED FOR SEDIMENTATION BASINS/TRAPS:_____
_____
_____
_____
_____
_____

TO BE PERFORMED BY: _____ ON OR BEFORE: _____

INSPECTION AND MAINTENANCE REPORT FORM

For
Proposed 4-Story Apartment Building
- 501 Pond St, Ashland MA-

CHANGES REQUIRED TO THE POLLUTION PREVENTION PLAN:

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

REASONS FOR CHANGES:

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Signed:_____ Date: _____

APPENDIX D:

Soil data

TEST DATE : 10/7/21
EVALUATOR BRUCE SALUK
S.E # : 2129
B.H ; TRASK

Commonwealth of Massachusetts
City/Town of ASHLAND, POND ST & CONVERSE WAY

Form 11 - Soil Suitability Assessment

G = 256.8

C. On-Site Review (continued)

Deep Observation Hole Number: T1

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
-32	F	- - -				L	-	-	-	-	
-40	A	7.5YR 3/1				SL	0	0	M	Fri	
-50	B	7.5YR 7/2				MS	0	0	g	L	
-67	C_1	2.5Y 6/3	58	7.5YR7/6 2.5Y8/3		MS	0	0	g	L	
-140	C_2	2.5Y 6/2				CS	725	725	g	L	

Additional Notes:

WEEPS @ 73"

GW @ 116"

ESHGW = 251.4 + (0.4) = 251.8

TEST DATE: 10/7/21
EVALUATOR BRUCE SALUK
S.E # : 2129
B.H. ; TRASK

Commonwealth of Massachusetts
City/Town of ASHLAND, POND ST & CONVERSE WAY
Form 11 - Soil Suitability Assessment

G=256.4

C. On-Site Review (continued)

Deep Observation Hole Number: T2

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
-6	A	7.5YR 3/1				SL			M	Fri	
-12	Bw	7.5YR 7/2				M.S.	0	0	g	L	
-42	C_1	2.5Y 8/3				M.S.	0	0	g	L	
-80	C_2	2.5Y 6/2				C.S	>25	>25	g	L	

Additional Notes:

GW @ 74"

ESHGW = 250.2 + corr. = 250.6

TEST DATE : 10/7/21
EVALUATOR BRUCE SALUK
S.E # : 2129
B.H. ; TRASK

Commonwealth of Massachusetts
City/Town of ASHLAND, POND ST & CONVERSE WAY

Form 11 - Soil Suitability Assessment

G = 256.2

C. On-Site Review (continued)

Deep Observation Hole Number: T3

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
-16	F	- - -				L	-	-	-	-	
-22	A	7.5YR 3/1				SL	0	0	M	Fri	
-33	Bw	7.5YR 7/2				M.S.	0	0	g	L	
-54	C_1	2.5Y 8/3				M.S.	0	0	g	L	
-142	C_2	2.5Y 6/2				C.S.	>25	>25	g	L	

Additional Notes:

GW @ 108

ESHGW = 247.2 + CORR. = 247.6

TEST DATE : 10/7/21
EVALUATOR BRUCE SALUK
S.E # : 2129
B.H. ; TRASK

Commonwealth of Massachusetts
City/Town of ASHLAND, POND ST & CONVERSE WAY
Form 11 - Soil Suitability Assessment

G = 254.8

C. On-Site Review (continued)

Deep Observation Hole Number: T4

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
-29	F	---				L	—	—	—	—	
-80	C_1	2.5Y 8/3				MS	0	0	9	L	
-130	C_2	2.5Y 6/2				CS	>25	>25	9	L	

Additional Notes:

GW @ 100" FAST WEEPS @ 80"
LARGE BOULDER ON EAST SIDE OF HOLE -43" (TOP)
ESHGW = 248.1 + CORR = 248.5

TEST DATE : 10/7/21
EVALUATOR BRUCE SALUK
S.E # : 2129
B.H ; TRASK

Commonwealth of Massachusetts
City/Town of ASHLAND, POND ST & CONVERSE WAY
Form 11 - Soil Suitability Assessment

C. On-Site Review (continued)

Deep Observation Hole Number: T5

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
-72	F*					L	—	—	—	—	
-100	C_1					MS	0	0	g	L	
-130	C_2					CS	>25	>25	g	L	

Additional Notes:

GW = 110" FAST WEEPS @ 93"

* FILL RANGES FROM 72" WEST & 100" EAST

ESHGW @ MW 'B' = 250.0 (10/7/21)

USE GW @ MW 'B' = 250.5 (4/21/22)

TEST DATE : 10/7/21
EVALUATOR BRUCE SALUK
S.E # : 2129
B.H. ; TRASK

Commonwealth of Massachusetts
City/Town of ASHLAND, POND ST & CONVERSE WAY
Form 11 - Soil Suitability Assessment

C. On-Site Review (continued)

Deep Observation Hole Number: T6

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
-24"	F*	—				L	—	—	M	—	
-120	C_1	2.5Y 8/3				MS	0	0	9	L	

Additional Notes:

GW @ 80" WEEPS @ 78"

VARIEGATED COLORS (NOT MOTTLES)

* FILL RANGES BETWEEN 2" - 60" DEPTH

ESHGW @ MW'C' = 250.9 (10/7/21)

USE GW @ MW 'C' = 251.3 (4/21/22)

TEST DATE : 10/7/21
EVALUATOR BRUCE SALUK
S.E # : 2129
B.H ; TRASK

Commonwealth of Massachusetts
City/Town of ASHLAND, POND ST & CONVERSE WAY

Form 11 - Soil Suitability Assessment

C. On-Site Review (continued)

Deep Observation Hole Number: T7

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
48-72	F	—				L					
-120	C1	2.5Y 8/3				MS	0	0	9	L	

Additional Notes:

GW @ 77

BRUCE SALUK & ASSOCIATES, INC.
CIVIL ENGINEERS & LAND SURVEYORS
MARLBOROUGH, MASSACHUSETTS
TEL. 508-485-1662 • FAX 508-481-9929
E-MAIL bsamarlbor@aol.com

SUBJECT _____

JOB NO. 2874

SHEET NO. _____ OF _____

DATE _____

COMPUTED _____

CHECKED _____

GROUND WATER READINGS
MONITORING WELL

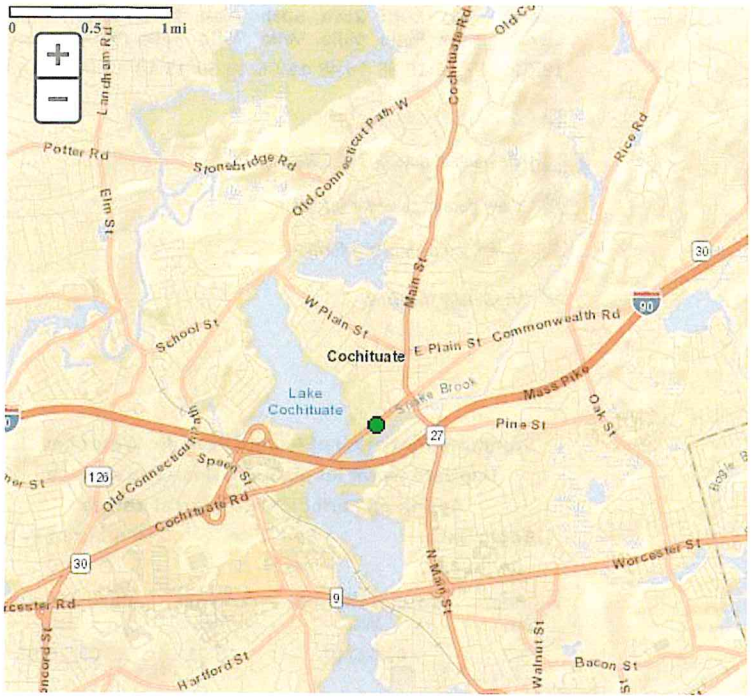
	A	B	C	TP-2
DATE	10/7/21	"	"	
GW	250.5	249.1	251.5	
CORR.	0.3	0.3	0.3	
ESHGW	250.8	249.4	251.8	
DATE	11/6/21	"	"	
GW	250.8	249.4	251.3	
CORR.	0.4	0.4	0.4	
ESHGW	250.9	249.7	251.7	
DATE	4/21/22	"	"	"
GW	251.3	250.5	252.1	252.3
CORR.	—	—	—	—
ESHGW	251.3	250.5	252.1	252.3

GROUND WATER CORRECTIONS FROM GROUND WATER WATCH – WAYLAND (MA-WKW 2R) APRIL 50%ile FOR 10/7/21 TESTING

USGS
science for a changing world

Groundwater Watch

Site Number: 421853071220501 - MA-WKW 2R WAYLAND, MA



Groundwater Watch Help Page

DESCRIPTION:
Latitude 42°18'53", Longitude 71°22'05" NAD83
Middlesex County, Massachusetts, Hydrologic Unit 01070005
Well depth: 32.3 feet
Hole depth: 33.5 feet
Land surface altitude: 153.02feet above NAVD88.
Well completed in "Sand and gravel aquifers (glaciated regions)" (N100GLCIAL) national aquifer.
Well completed in "Outwash" (112OTSH) local aquifer

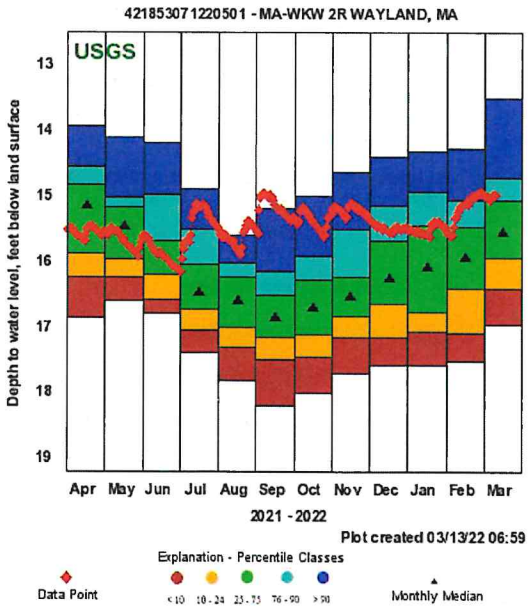
AVAILABLE DATA:

Data Type	Begin Date	End Date	Count
Current / Historical Observations	2018-09-05	2022-04-17	
Daily Data			
Depth to water level, feet below land surface	2010-10-14	2022-04-16	4101
Daily Statistics			
Depth to water level, feet below land surface	2010-10-14	2022-01-30	4025
Monthly Statistics			
Depth to water level, feet below land surface	2010-10	2022-01	
Annual Statistics			
Depth to water level, feet below land surface	2011	2022	
Field groundwater-level measurements	1965-01-29	2022-04-11	621
Water-Year Summary	2014	2021	8

Additional Data Sources		Begin Date	End Date	Count
Groundwater Watch	**offsite**	1965	2021	4505

OPERATION:
Record for this site is maintained by the USGS Massachusetts Water Science Center
Email questions about this site to Massachusetts Water Science Center Water-Data Inquiries

Site Statistics



Most recent data value: 15.07 on 4/20/2022
Period of Record Monthly Statistics for 421853071220501
Depth to water level, feet below land surface
All Approved Continuous & Periodic Data Used In Analysis
Note: Highlighted values in the table indicate closest statistic to the most recent data value.

Month	Lowest Median	10th %ile	25th %ile	50th %ile	75th %ile	90th %ile	Highest Median	Number of Years
Jan	17.58	17.06	16.74	16.09	15.47	14.95	14.31	57
Feb	17.52	17.10	16.40	15.94	15.48	15.06	14.28	56
Mar	16.96	16.42	15.95	15.55	15.06	14.72	13.50	56
Apr	16.86	16.24	15.88	15.15	14.82	14.55	13.93	57
May	16.61	16.23	15.96	15.47	15.18	15.02	14.10	56
Jun	16.79	16.58	16.19	15.90	15.69	14.98	14.19	57
Jul	17.40	17.05	16.73	16.48	16.04	15.52	14.89	57
Aug	17.82	17.30	17.00	16.61	16.25	16.02	15.60	56
Sep	18.21	17.51	17.16	16.86	16.52	16.15	15.20	57
Oct	18.01	17.45	17.11	16.72	16.28	15.91	14.99	57
Nov	17.71	17.16	16.83	16.51	16.17	15.29	14.63	57
Dec	17.59	17.16	16.63	16.24	15.65	15.17	14.40	56

As of 4/16/2022 11:15:2

Statistics Options

View month/year statistics

CORR = 15.07 - 15.15 = -0.1
use '0'

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Middlesex County, Massachusetts

Pond Street

October 17, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:1,720 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 25 50 100 150

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 21, Sep 2, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 31, 2020—Oct 22, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
424D	Canton fine sandy loam, 15 to 25 percent slopes, extremely bouldery	1.3	14.7%
653	Udorthents, sandy	7.2	80.7%
656	Udorthents-Urban land complex	0.4	4.6%
Totals for Area of Interest		**9.0**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The

delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Middlesex County, Massachusetts

424D—Canton fine sandy loam, 15 to 25 percent slopes, extremely bouldery

Map Unit Setting

National map unit symbol: vqs3
Elevation: 0 to 1,000 feet
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Canton and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canton

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Friable loamy eolian deposits over friable sandy basal till derived from granite and gneiss

Typical profile

H1 - 0 to 8 inches: fine sandy loam
H2 - 8 to 21 inches: fine sandy loam
H3 - 21 to 65 inches: gravelly loamy sand

Properties and qualities

Slope: 15 to 25 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 18 to 30 inches to strongly contrasting textural stratification
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Charlton

Percent of map unit: 10 percent
Landform: Drumlins, ground moraines
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Hinckley

Percent of map unit: 5 percent
Landform: Terraces, ridges, eskers
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

653—Udorthents, sandy

Map Unit Setting

National map unit symbol: vr1k
Elevation: 0 to 3,000 feet
Mean annual precipitation: 32 to 50 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 110 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents, sandy, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents, Sandy

Setting

Parent material: Loamy alluvium and/or sandy glaciofluvial deposits and/or loamy glaciolacustrine deposits and/or loamy marine deposits and/or loamy basal till and/or loamy lodgment till

Properties and qualities

Slope: 0 to 25 percent
Depth to restrictive feature: More than 80 inches
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Minor Components

Udorthents, loamy
Percent of map unit: 5 percent
Hydric soil rating: No

Urban land
Percent of map unit: 5 percent
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear

Unnamed
Percent of map unit: 5 percent

656—Udorthents-Urban land complex

Map Unit Setting
National map unit symbol: 995k
Elevation: 0 to 3,000 feet
Mean annual precipitation: 32 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 110 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition
Udorthents and similar soils: 45 percent
Urban land: 35 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents

Setting
Parent material: Loamy alluvium and/or sandy glaciofluvial deposits and/or loamy glaciolacustrine deposits and/or loamy marine deposits and/or loamy basal till and/or loamy lodgment till

Properties and qualities
Slope: 0 to 15 percent
Depth to restrictive feature: More than 80 inches
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Description of Urban Land

Setting
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope

Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Excavated and filled land

Minor Components

Canton

Percent of map unit: 10 percent
Landform: Hills
Landform position (two-dimensional): Backslope, toeslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Merrimac

Percent of map unit: 5 percent
Landform: Terraces, plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Paxton

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, summit
Landform position (three-dimensional): Head slope, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

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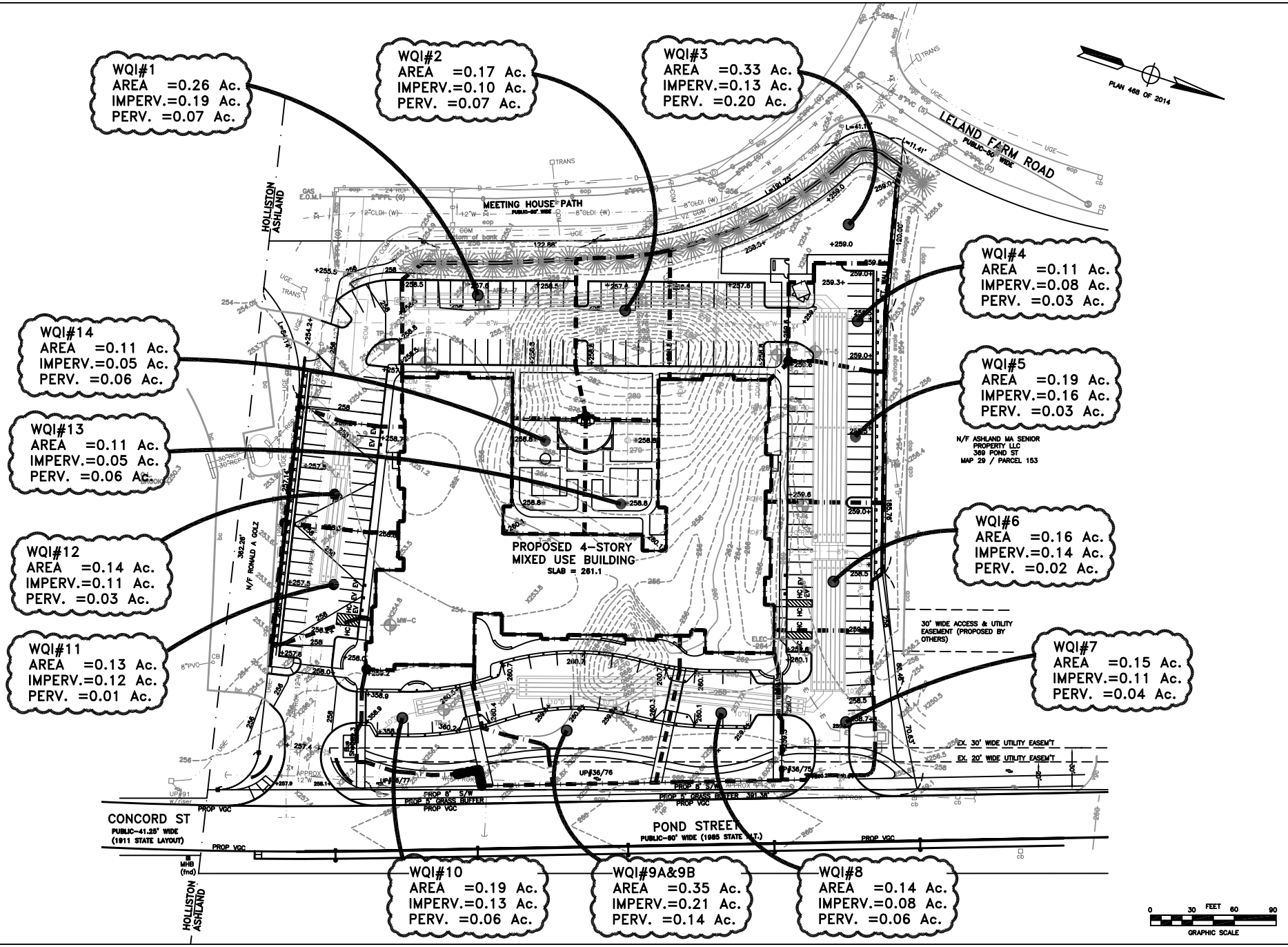
APPENDIX E:
Drainage Collection System Calculations



NO.	DATE	REVISION	BY
1	1/28/22	REVISION	BMS

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PROPOSED DRAINAGE SUBAREAS

POND STREET
ASHLAND ,MA

DEVELOPER:
TRASK INC
337 TURNPIKE ROAD, SUITE 201
SOUTHBOROUGH, MA 01772

DATE: NOVEMBER 6, 2021

DA3

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Storm Drainage Computations

Name: 4-Story Apartment Building
Ashland, MA
Location: Pond ST & Converse Way

Proj. No.: 2874
Date: 5/22/2022
Computed by: BMS

Design Parameters:
25 Year Storm*

RUNOFF										DESIGN									
LOCATION		AREA	C	C x A	SUM	FLOW TIME (MIN)		i		PIPE ASBUILT			CAPACITY		PROFILE				
FROM	TO	(AC.)			or C x A	PIPE	CONC TIME		Q cfs	PIPE TYPE	PIPE SIZE	SLOPE (ft/ft)	Q full cfs	V full ft/s	LENGTH	FALL	RIM UPPER	INV UPPER	INV LOWER
WQI#10	CS#1	0.19	0.71	0.14	0.14	0.08	5.00	6	0.8	HDPE	10	0.017	3.4	6.2	29	0.50	258.60	255.60	255.10
RC#2	CS#7	0.12	0.90	0.11	0.11	0.07	5.00	6	0.7	HDPE	10	0.064	6.6	12.0	50	3.20	NA	257.00	253.80
RC#4	CS#5	0.14	0.90	0.13	0.13	0.05	5.00	6	0.8	HDPE	10	0.058	6.2	11.4	33	1.90	NA	257.00	255.10
WQI#12	CS#8	0.14	0.75	0.11	0.11	0.11	5.00	6	0.6	HDPE	8	0.013	1.6	4.6	31	0.40	257.50	255.00	254.60

NOTES

1) WQI#10 & WQI#12 pipe connections represents the flow for flattest pipe slopes for the 10" & 8 " HDPE pipe connections;respectively.

2) All roof connections are greater than 4.00%(MIN) pipe slope, and RC#2 & RC#4 are the Roof connections with the largest flows for chamber systems 5 & 6 connections; respectively.

* Intensity (i) - Duration - Frequency Curve for Boston, MA

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Subject:	4 Story Apartment Building
Job No.	2874
Computed By:	BMS
Checked By:	
Date:	5/22/2022

Table #1

Drainage Subareas & Runoff Coefficients

SUBAREA (system component)	Pervious Area, As (C=0.20)	Impervious Area, Ap (C=0.90)	(Asx0.20)+ (Apx0.90)	Total Tributary Area (acres)	WEIGHTED "C"
WQI#1	0.07	0.19	0.19	0.26	0.71
WQI#2	0.07	0.10	0.10	0.17	0.61
WQI#3	0.20	0.13	0.16	0.33	0.48
WQI#4	0.03	0.08	0.08	0.11	0.71
WQI#5	0.03	0.16	0.15	0.19	0.79
WQI#6	0.02	0.14	0.13	0.16	0.81
WQI#7	0.04	0.11	0.11	0.15	0.71
WQI#8	0.06	0.08	0.08	0.14	0.60
WQI#9A	0.07	0.11	0.11	0.18	0.63
WQI9B	0.07	0.10	0.10	0.17	0.61
WQI#10	0.06	0.13	0.13	0.19	0.68
WQI#11	0.01	0.12	0.11	0.13	0.85
WQI#12	0.03	0.11	0.11	0.14	0.75
CB#13	0.06	0.05	0.057	0.11	0.52
CB#14	0.06	0.05	0.057	0.11	0.52

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Job No.	2874
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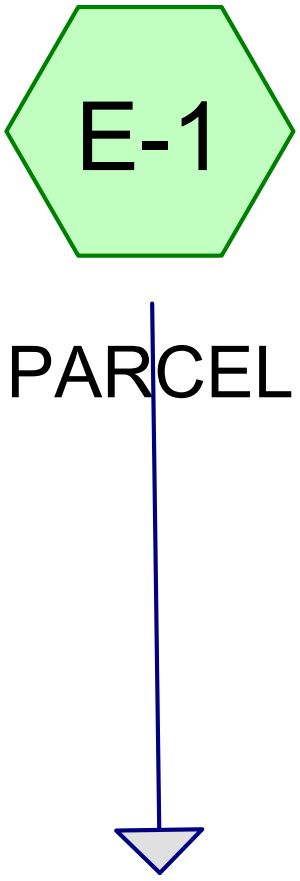
Table #1(Continued)

Drainage Subareas & Runoff Coefficients

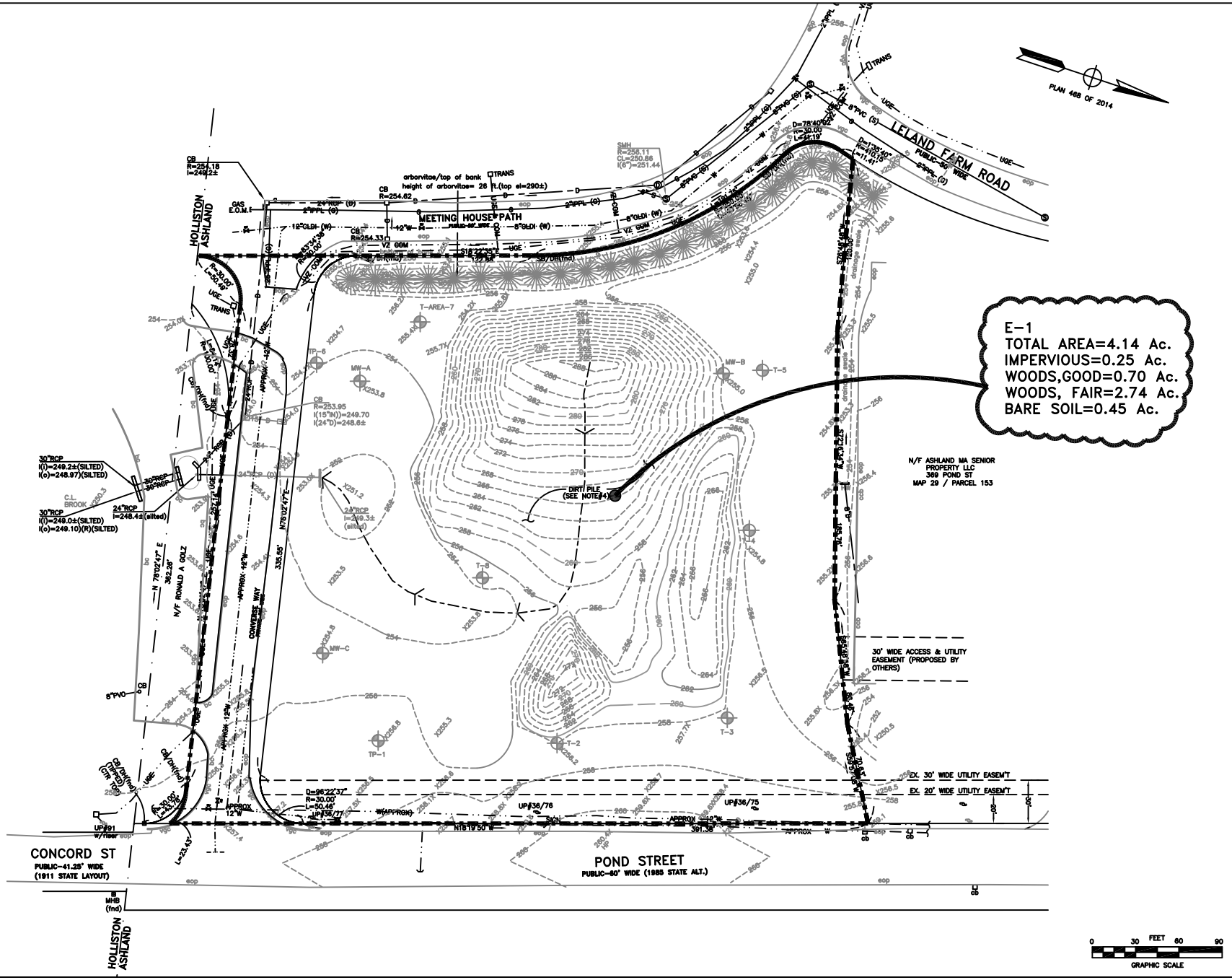
SUBAREA (system component)	Pervious Area, As (C=0.20)	Impervious Area, Ap (C=0.90)	(Asx0.20)+ (Apx0.90)	Total Tributary Area (acres)	WEIGHTED "C"
RC#1	0.00	0.11	0.10	0.11	0.90
RC#2	0.00	0.12	0.11	0.12	0.90
RC#3	0.00	0.12	0.11	0.12	0.90
RC#4	0.00	0.14	0.13	0.14	0.90
RC#5	0.00	0.14	0.13	0.14	0.90
RC#6	0.00	0.14	0.13	0.14	0.90
RC#7	0	0.14	0.13	0.14	0.90

APPENDIX F:
Hydrologic Calculations for Peak Runoff Rates
-Existing & Proposed Conditions-



Subcat Reach Pond Link

Routing Diagram for Existing Conditions-2874
Prepared by Bruce Saluk & Associates, Inc, Printed 5/22/2022



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EXISTING DRAINAGE AREA
POND STREET
ASHLAND ,MA

DEVELOPER:
TRASK INC
337 TURNPIKE ROAD, SUITE 201
SOUTHBOROUGH, MA 01772

DATE: NOVEMBER 6, 2021

DA1

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Summary for Subcatchment E-1: PARCEL

Runoff = 1.93 cfs @ 12.13 hrs, Volume= 0.193 af, Depth= 0.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 YR Rainfall=3.20"

	Area (ac)	CN	Description
	0.700	55	Woods, Good, HSG B
	2.740	60	Woods, Fair, HSG B
*	0.250	98	Paved, HSG B
	0.450	86	Newly graded area, HSG B
	4.140	64	Weighted Average
	3.890		93.96% Pervious Area
	0.250		6.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.2400	0.36		**Sheet Flow, Sheet Flow** Cultivated: Residue>20% n= 0.170 P2= 3.20"
1.3	151	0.1460	1.91		**Shallow Concentrated Flow, SCF** Woodland Kv= 5.0 fps
3.7	179	0.0260	0.81		**Shallow Concentrated Flow, SCF** Woodland Kv= 5.0 fps
7.3	380	Total			

Summary for Reach SUM: TOTAL FLOW

Inflow Area = 4.140 ac, 6.04% Impervious, Inflow Depth = 0.56" for 2 YR event
Inflow = 1.93 cfs @ 12.13 hrs, Volume= 0.193 af
Outflow = 1.93 cfs @ 12.13 hrs, Volume= 0.193 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 4

Summary for Subcatchment E-1: PARCEL

Runoff = 5.37 cfs @ 12.12 hrs, Volume= 0.437 af, Depth= 1.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 YR Rainfall=4.50"

	Area (ac)	CN	Description
	0.700	55	Woods, Good, HSG B
	2.740	60	Woods, Fair, HSG B
*	0.250	98	Paved, HSG B
	0.450	86	Newly graded area, HSG B
	4.140	64	Weighted Average
	3.890		93.96% Pervious Area
	0.250		6.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.2400	0.36		**Sheet Flow, Sheet Flow** Cultivated: Residue>20% n= 0.170 P2= 3.20"
1.3	151	0.1460	1.91		**Shallow Concentrated Flow, SCF** Woodland Kv= 5.0 fps
3.7	179	0.0260	0.81		**Shallow Concentrated Flow, SCF** Woodland Kv= 5.0 fps
7.3	380	Total			

Summary for Reach SUM: TOTAL FLOW

Inflow Area = 4.140 ac, 6.04% Impervious, Inflow Depth = 1.27" for 10 YR event
Inflow = 5.37 cfs @ 12.12 hrs, Volume= 0.437 af
Outflow = 5.37 cfs @ 12.12 hrs, Volume= 0.437 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 4

Summary for Subcatchment E-1: PARCEL

Runoff = 8.52 cfs @ 12.11 hrs, Volume= 0.660 af, Depth= 1.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 YR Rainfall=5.50"

	Area (ac)	CN	Description
	0.700	55	Woods, Good, HSG B
	2.740	60	Woods, Fair, HSG B
*	0.250	98	Paved, HSG B
	0.450	86	Newly graded area, HSG B
	4.140	64	Weighted Average
	3.890		93.96% Pervious Area
	0.250		6.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.2400	0.36		**Sheet Flow, Sheet Flow** Cultivated: Residue>20% n= 0.170 P2= 3.20"
1.3	151	0.1460	1.91		**Shallow Concentrated Flow, SCF** Woodland Kv= 5.0 fps
3.7	179	0.0260	0.81		**Shallow Concentrated Flow, SCF** Woodland Kv= 5.0 fps
7.3	380	Total			

Summary for Reach SUM: TOTAL FLOW

Inflow Area = 4.140 ac, 6.04% Impervious, Inflow Depth = 1.91" for 25 YR event
Inflow = 8.52 cfs @ 12.11 hrs, Volume= 0.660 af
Outflow = 8.52 cfs @ 12.11 hrs, Volume= 0.660 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 4

Summary for Subcatchment E-1: PARCEL

Runoff = 13.74 cfs @ 12.11 hrs, Volume= 1.035 af, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 YR Rainfall=7.00"

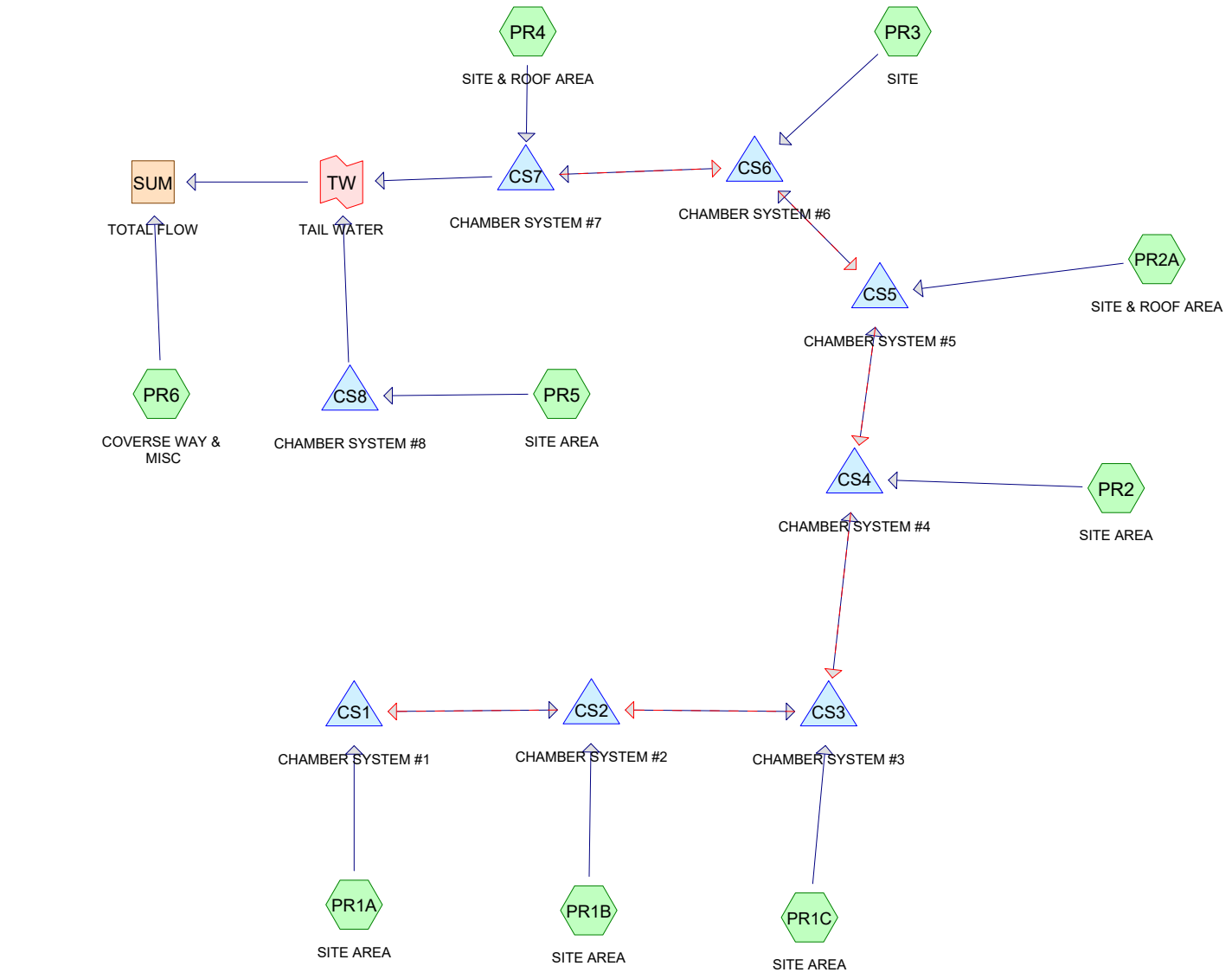
	Area (ac)	CN	Description
	0.700	55	Woods, Good, HSG B
	2.740	60	Woods, Fair, HSG B
*	0.250	98	Paved, HSG B
	0.450	86	Newly graded area, HSG B
	4.140	64	Weighted Average
	3.890		93.96% Pervious Area
	0.250		6.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.2400	0.36		**Sheet Flow, Sheet Flow** Cultivated: Residue>20% n= 0.170 P2= 3.20"
1.3	151	0.1460	1.91		**Shallow Concentrated Flow, SCF** Woodland Kv= 5.0 fps
3.7	179	0.0260	0.81		**Shallow Concentrated Flow, SCF** Woodland Kv= 5.0 fps
7.3	380	Total			

Summary for Reach SUM: TOTAL FLOW

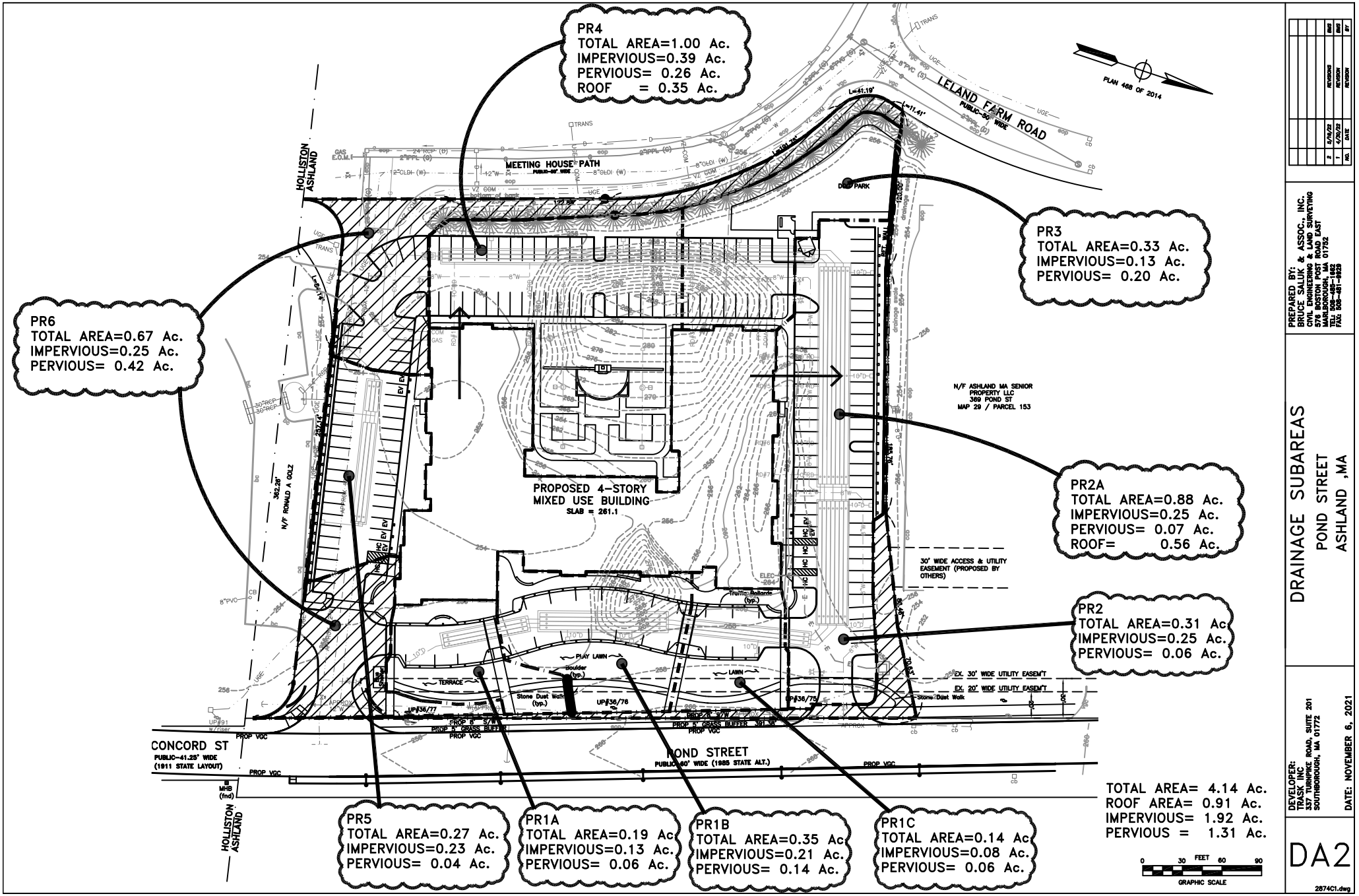
Inflow Area = 4.140 ac, 6.04% Impervious, Inflow Depth = 3.00" for 100 YR event
Inflow = 13.74 cfs @ 12.11 hrs, Volume= 1.035 af
Outflow = 13.74 cfs @ 12.11 hrs, Volume= 1.035 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 4



Routing Diagram for Proposed Conditions-2874

Prepared by Bruce Saluk & Associates, Inc, Printed 5/22/2022



NO.	DATE	REVISIONS	BY
2	5/16/22	REVISIONS	BMS
1	4/26/22	REVISION	BMS

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DRAINAGE SUBAREAS
POND STREET
ASHLAND ,MA

DEVELOPER:
TRASK INC.
337 TURNPIKE ROAD, SUITE 201
SOUTHBOROUGH, MA 01772

DATE: NOVEMBER 6, 2021

DA2

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Summary for Subcatchment PR1A: SITE AREA

Runoff = 0.42 cfs @ 12.07 hrs, Volume= 0.029 af, Depth= 1.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 YR Rainfall=3.20"

	Area (ac)	CN	Description
*	0.130	98	Impervious Area
	0.060	61	>75% Grass cover, Good, HSG B
	0.190	86	Weighted Average
	0.060		31.58% Pervious Area
	0.130		68.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment PR1B: SITE AREA

Runoff = 0.68 cfs @ 12.08 hrs, Volume= 0.047 af, Depth= 1.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 YR Rainfall=3.20"

	Area (ac)	CN	Description
*	0.210	98	Impervious Area
	0.140	61	>75% Grass cover, Good, HSG B
	0.350	83	Weighted Average
	0.140		40.00% Pervious Area
	0.210		60.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment PR1C: SITE AREA

Runoff = 0.26 cfs @ 12.08 hrs, Volume= 0.018 af, Depth= 1.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 YR Rainfall=3.20"

	Area (ac)	CN	Description
*	0.080	98	Impervious Area
	0.060	61	>75% Grass cover, Good, HSG B
	0.140	82	Weighted Average
	0.060		42.86% Pervious Area
	0.080		57.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment PR2: SITE AREA

Runoff = 0.84 cfs @ 12.07 hrs, Volume= 0.058 af, Depth= 2.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 YR Rainfall=3.20"

	Area (ac)	CN	Description
*	0.250	98	Impervious Area
	0.060	61	>75% Grass cover, Good, HSG B
	0.310	91	Weighted Average
	0.060		19.35% Pervious Area
	0.250		80.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment PR2A: SITE & ROOF AREA

Runoff = 2.67 cfs @ 12.07 hrs, Volume= 0.194 af, Depth= 2.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 YR Rainfall=3.20"

	Area (ac)	CN	Description
*	0.250	98	Impervious Area
	0.070	61	>75% Grass cover, Good, HSG B
*	0.560	98	Roof
	0.880	95	Weighted Average
	0.070		7.95% Pervious Area
	0.810		92.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment PR3: SITE

Runoff = 0.45 cfs @ 12.08 hrs, Volume= 0.032 af, Depth= 1.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 YR Rainfall=3.20"

	Area (ac)	CN	Description
*	0.130	98	Impervious Area
	0.200	61	>75% Grass cover, Good, HSG B
	0.330	76	Weighted Average
	0.200		60.61% Pervious Area
	0.130		39.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment PR4: SITE & ROOF AREA

Runoff = 2.42 cfs @ 12.07 hrs, Volume= 0.166 af, Depth= 2.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 YR Rainfall=3.20"

	Area (ac)	CN	Description
*	0.390	98	Impervious Area
	0.260	61	>75% Grass cover, Good, HSG B
*	0.350	98	Roof
	1.000	88	Weighted Average
	0.260		26.00% Pervious Area
	0.740		74.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment PR5: SITE AREA

Runoff = 0.78 cfs @ 12.07 hrs, Volume= 0.055 af, Depth= 2.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 YR Rainfall=3.20"

	Area (ac)	CN	Description
*	0.230	98	Impervious Area
	0.040	61	>75% Grass cover, Good, HSG B
	0.270	93	Weighted Average
	0.040		14.81% Pervious Area
	0.230		85.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment PR6: COVERSE WAY & MISC

Runoff = 0.85 cfs @ 12.08 hrs, Volume= 0.061 af, Depth= 1.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 YR Rainfall=3.20"

	Area (ac)	CN	Description
	0.420	61	>75% Grass cover, Good, HSG B
*	0.250	98	Paved
	0.670	75	Weighted Average
	0.420		62.69% Pervious Area
	0.250		37.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Assumed Tc**

Summary for Reach SUM: TOTAL FLOW

Inflow = 1.03 cfs @ 12.23 hrs, Volume= 0.083 af
Outflow = 1.03 cfs @ 12.24 hrs, Volume= 0.083 af, Atten= 0%, Lag= 0.6 min

Routing by Sim-Route method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Pond CS1: CHAMBER SYSTEM #1

Inflow = 0.42 cfs @ 12.07 hrs, Volume= 0.029 af
Outflow = 0.16 cfs @ 7.52 hrs, Volume= 0.115 af, Atten= 63%, Lag= 0.0 min
Discarded = 0.16 cfs @ 7.52 hrs, Volume= 0.115 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Sim-Route method w/Net Flows, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 255.09' @ 12.34 hrs Surf.Area= 816 sf Storage= 161 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 119.9 min (941.5 - 821.6)

Volume	Invert	Avail.Storage	Storage Description
#1	254.60'	648 cf	**12.00'W x 68.00'L x 2.80'H Prismatoid** 2,285 cf Overall - 665 cf Embedded = 1,619 cf x 40.0% Voids
#2	255.10'	663 cf	**Cultec R-180** x 30 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 3 rows
#3	255.10'	2 cf	**Cultec HVLV FC-24** x 4 Inside #1 Effective Size= 15.3"W x 12.0"H => 0.91 sf x 0.50'L = 0.5 cf Overall Size= 16.0"W x 12.0"H x 2.02'L with 1.52' Overlap 4 Chambers in 3 Rows
#4	255.10'	57 cf	**12.0" Round Pipe Storage** x 3 -Impervious L= 24.0' S= 0.0200 '/'
#5	255.10'	14 cf	**10.0" Round Pipe Storage**-Impervious L= 25.0' S= 0.0200 '/'
#6	255.50'	63 cf	**4.00'D x 5.00'H Vertical Cone/Cylinder**-Impervious
		1,446 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	254.60'	**8.270 in/hr Exfiltration over Horizontal area**
#2	Primary	255.10'	**12.0" Vert. Orifice/Grate X 2.00** C= 0.600
#3	Primary	258.60'	**2.0" x 2.0" Horiz. Orifice/Grate X 6.00 columns** X 6 rows C= 0.600 in 24.0" x 24.0" Grate (25% open area) Limited to weir flow at low heads

Discarded OutFlow Max=0.16 cfs @ 7.52 hrs HW=254.60' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.16 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=254.60' TW=254.60' (Dynamic Tailwater)
├**2=Orifice/Grate** (Controls 0.00 cfs)
└**3=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond CS2: CHAMBER SYSTEM #2

Inflow	=	0.68 cfs @	12.08 hrs, Volume=	0.047 af
Outflow	=	0.30 cfs @	11.98 hrs, Volume=	0.047 af, Atten= 56%, Lag= 0.0 min
Discarded	=	0.30 cfs @	11.98 hrs, Volume=	0.047 af
Primary	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af
Secondary	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af

Routing by Sim-Route method w/Net Flows, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 254.91' @ 12.27 hrs Surf.Area= 1,584 sf Storage= 197 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 2.9 min (834.9 - 832.0)

Volume	Invert	Avail.Storage	Storage Description
#1	254.60'	1,244 cf	**16.00'W x 99.00'L x 2.80'H Prismatoid** 4,435 cf Overall - 1,324 cf Embedded = 3,111 cf x 40.0% Voids
#2	255.10'	1,320 cf	**Cultec R-180** x 60 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 4 rows
#3	255.10'	4 cf	**Cultec HVLV FC-24** x 9 Inside #1 Effective Size= 15.3"W x 12.0"H => 0.91 sf x 0.50'L = 0.5 cf Overall Size= 16.0"W x 12.0"H x 2.02'L with 1.52' Overlap 9 Chambers in 4 Rows
#4	255.10'	57 cf	**12.0" Round Pipe Storage** x 3 -Impervious L= 24.0' S= 0.0200 '/'
#5	255.10'	38 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder**-Impervious
#6	255.10'	85 cf	**12.0" Round Pipe Storage**-Impervious L= 108.0' S= 0.0200 '/'
		2,748 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600
#2	Discarded	254.60'	**8.270 in/hr Exfiltration over Horizontal area** Phase-In= 0.01'
#3	Secondary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.30 cfs @ 11.98 hrs HW=254.61' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.30 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=254.60' TW=254.60' (Dynamic Tailwater)
└**1=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=254.60' TW=254.60' (Dynamic Tailwater)
└**3=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond CS3: CHAMBER SYSTEM #3

Inflow	=	0.26 cfs @	12.08 hrs, Volume=	0.018 af
Outflow	=	0.23 cfs @	12.05 hrs, Volume=	0.018 af, Atten= 13%, Lag= 0.0 min
Discarded	=	0.23 cfs @	12.05 hrs, Volume=	0.018 af
Primary	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af
Secondary	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af

Routing by Sim-Route method w/Net Flows, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 254.62' @ 12.12 hrs Surf.Area= 1,188 sf Storage= 11 cf

Plug-Flow detention time= 0.4 min calculated for 0.018 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (835.7 - 835.3)

Volume	Invert	Avail.Storage	Storage Description
#1	254.60'	933 cf	**12.00'W x 99.00'L x 2.80'H Prismatoid** 3,326 cf Overall - 993 cf Embedded = 2,334 cf x 40.0% Voids
#2	255.10'	990 cf	**Cultec R-180** x 45 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 3 rows
#3	255.10'	3 cf	**Cultec HVLV FC-24** x 6 Inside #1 Effective Size= 15.3"W x 12.0"H => 0.91 sf x 0.50'L = 0.5 cf Overall Size= 16.0"W x 12.0"H x 2.02'L with 1.52' Overlap 6 Chambers in 3 Rows
#4	255.10'	57 cf	**12.0" Round Pipe Storage** x 3 -Impervious L= 24.0' S= 0.0200 '/'
#5	255.10'	151 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder** x 4 -Impervious
#6	255.10'	5 cf	**10.0" Round Pipe Storage**-Impervious L= 10.0' S= 0.0200 '/'
		2,139 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600
#2	Discarded	254.60'	**8.270 in/hr Exfiltration over Horizontal area** Phase-In= 0.01'
#3	Secondary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.23 cfs @ 12.05 hrs HW=254.61' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.23 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=254.60' TW=254.60' (Dynamic Tailwater)
↑**1=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=254.60' TW=254.60' (Dynamic Tailwater)
↑**3=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond CS4: CHAMBER SYSTEM #4

Inflow	=	0.84 cfs @	12.07 hrs, Volume=	0.061 af
Outflow	=	0.45 cfs @	11.99 hrs, Volume=	0.061 af, Atten= 46%, Lag= 0.0 min
Discarded	=	0.45 cfs @	11.99 hrs, Volume=	0.061 af
Primary	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af
Secondary	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af

Routing by Sim-Route method w/Net Flows, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 254.81' @ 12.30 hrs Surf.Area= 2,375 sf Storage= 196 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 2.0 min (800.4 - 798.4)

Volume	Invert	Avail.Storage	Storage Description
#1	254.60'	1,967 cf	**25.00'W x 95.00'L x 2.80'H Prismatoid** 6,650 cf Overall - 1,733 cf Embedded = 4,917 cf x 40.0% Voids
#2	255.10'	1,724 cf	**Cultec R-150XLHD** x 63 Inside #1 Effective Size= 29.8"W x 18.0"H => 2.65 sf x 10.25'L = 27.2 cf Overall Size= 33.0"W x 18.5"H x 11.00'L with 0.75' Overlap Row Length Adjustment= +0.75' x 2.65 sf x 7 rows
#3	255.10'	8 cf	**Cultec R-150XLHD-FC-24** x 18 Inside #1 Effective Size= 15.3"W x 12.0"H => 0.91 sf x 0.50'L = 0.5 cf Overall Size= 16.0"W x 12.0"H x 2.02'L with 1.52' Overlap 18 Chambers in 7 Rows
#4	255.10'	82 cf	**10.0" Round Pipe Storage**-Impervious L= 150.0' S= 0.0200 '/'
#5	255.10'	151 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder** x 4 -Impervious
		3,932 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	255.10'	**12.0" Vert. Orifice/Grate X 5.00** C= 0.600
#2	Discarded	254.60'	**8.270 in/hr Exfiltration over Horizontal area** Phase-In= 0.01'
#3	Secondary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.45 cfs @ 11.99 hrs HW=254.61' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.45 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=254.60' TW=254.60' (Dynamic Tailwater)
↑—**1=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=254.60' TW=254.60' (Dynamic Tailwater)
↑—**3=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond CS5: CHAMBER SYSTEM #5

Inflow	=	2.67 cfs @	12.07 hrs, Volume=	0.194 af
Outflow	=	1.07 cfs @	12.27 hrs, Volume=	0.194 af, Atten= 60%, Lag= 12.2 min
Discarded	=	0.80 cfs @	11.82 hrs, Volume=	0.188 af
Primary	=	0.13 cfs @	12.27 hrs, Volume=	0.003 af
Secondary	=	0.13 cfs @	12.27 hrs, Volume=	0.003 af

Routing by Sim-Route method w/Net Flows, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 255.20' @ 12.27 hrs Surf.Area= 4,175 sf Storage= 1,181 cf

Plug-Flow detention time= 5.9 min calculated for 0.194 af (100% of inflow)
Center-of-Mass det. time= 5.9 min (785.9 - 780.0)

Volume	Invert	Avail.Storage	Storage Description
#1	254.60'	3,450 cf	**25.00'W x 167.00'L x 2.80'H Prismatoid** 11,690 cf Overall - 3,066 cf Embedded = 8,624 cf x 40.0% Voids
#2	255.10'	3,055 cf	**Cultec R-150XLHD** x 112 Inside #1 Effective Size= 29.8"W x 18.0"H => 2.65 sf x 10.25'L = 27.2 cf Overall Size= 33.0"W x 18.5"H x 11.00'L with 0.75' Overlap Row Length Adjustment= +0.75' x 2.65 sf x 7 rows
#3	255.10'	11 cf	**Cultec R-150XLHD-FC-24** x 24 Inside #1 Effective Size= 15.3"W x 12.0"H => 0.91 sf x 0.50'L = 0.5 cf Overall Size= 16.0"W x 12.0"H x 2.02'L with 1.52' Overlap 24 Chambers in 7 Rows
#4	255.10'	82 cf	**10.0" Round Pipe Storage**-Impervious L= 150.0' S= 0.0200 '/'
#5	255.10'	151 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder** x 4 -Impervious
		6,748 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600
#2	Discarded	254.60'	**8.270 in/hr Exfiltration over Horizontal area** Phase-In= 0.01'
#3	Secondary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.80 cfs @ 11.82 hrs HW=254.61' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.80 cfs)

Primary OutFlow Max=0.13 cfs @ 12.27 hrs HW=255.20' TW=255.09' (Dynamic Tailwater)
↑—**1=Orifice/Grate** (Orifice Controls 0.13 cfs @ 1.08 fps)

Secondary OutFlow Max=0.13 cfs @ 12.27 hrs HW=255.20' TW=254.80' (Dynamic Tailwater)
↑—**3=Orifice/Grate** (Orifice Controls 0.13 cfs @ 1.08 fps)

Summary for Pond CS6: CHAMBER SYSTEM #6

Inflow	=	0.45 cfs @	12.08 hrs, Volume=	0.035 af
Outflow	=	0.23 cfs @	12.41 hrs, Volume=	0.035 af, Atten= 49%, Lag= 20.0 min
Discarded	=	0.19 cfs @	11.98 hrs, Volume=	0.034 af
Primary	=	0.04 cfs @	12.41 hrs, Volume=	0.001 af
Secondary	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af

Routing by Sim-Route method w/Net Flows, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 255.16' @ 12.41 hrs Surf.Area= 976 sf Storage= 239 cf

Plug-Flow detention time= 5.8 min calculated for 0.035 af (100% of inflow)
Center-of-Mass det. time= 5.8 min (850.8 - 845.0)

Volume	Invert	Avail.Storage	Storage Description
#1	254.60'	772 cf	**16.00'W x 61.00'L x 2.80'H Prismatoid** 2,733 cf Overall - 802 cf Embedded = 1,931 cf x 40.0% Voids
#2	255.10'	798 cf	**Cultec R-180** x 36 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 4 rows
#3	255.10'	4 cf	**Cultec HVLV FC-24** x 9 Inside #1 Effective Size= 15.3"W x 12.0"H => 0.91 sf x 0.50'L = 0.5 cf Overall Size= 16.0"W x 12.0"H x 2.02'L with 1.52' Overlap 9 Chambers in 4 Rows
#4	255.10'	47 cf	**12.0" Round Pipe Storage**-Impervious L= 60.0' S= 0.0200 '/'
#5	255.10'	38 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder**-Impervious
		1,659 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600
#2	Discarded	254.60'	**8.270 in/hr Exfiltration over Horizontal area** Phase-In= 0.01'
#3	Secondary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.19 cfs @ 11.98 hrs HW=254.61' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.19 cfs)

Primary OutFlow Max=0.04 cfs @ 12.41 hrs HW=255.16' TW=254.14' (Dynamic Tailwater)
↑—**1=Orifice/Grate** (Orifice Controls 0.04 cfs @ 0.80 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=254.60' TW=254.60' (Dynamic Tailwater)
↑—**3=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond CS7: CHAMBER SYSTEM #7

Inflow	=	2.42 cfs @	12.07 hrs, Volume=	0.167 af
Outflow	=	1.02 cfs @	12.28 hrs, Volume=	0.167 af, Atten= 58%, Lag= 12.1 min
Discarded	=	0.49 cfs @	11.74 hrs, Volume=	0.147 af
Primary	=	0.53 cfs @	12.28 hrs, Volume=	0.020 af
Secondary	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af

Routing by Sim-Route method w/Net Flows, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 254.17' @ 12.28 hrs Surf.Area= 2,544 sf Storage= 1,266 cf

Plug-Flow detention time= 9.4 min calculated for 0.167 af (100% of inflow)
Center-of-Mass det. time= 9.4 min (823.3 - 813.9)

Volume	Invert	Avail.Storage	Storage Description
#1	253.30'	2,185 cf	**12.00'W x 212.00'L x 3.00'H Prismatoid** 7,632 cf Overall - 2,169 cf Embedded = 5,463 cf x 40.0% Voids
#2	253.80'	2,166 cf	**Cultec R-180** x 99 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 3 rows
#3	253.80'	4 cf	**Cultec HVLV FC-24** x 8 Inside #1 Effective Size= 15.3"W x 12.0"H => 0.91 sf x 0.50'L = 0.5 cf Overall Size= 16.0"W x 12.0"H x 2.02'L with 1.52' Overlap 8 Chambers in 3 Rows
#4	253.80'	24 cf	**12.0" Round Pipe Storage**-Impervious L= 30.0' S= 0.0200 '/'
#5	253.80'	75 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder** x 2 -Impervious
#6	253.80'	74 cf	**10.0" Round Pipe Storage**-Impervious L= 135.0' S= 0.0200 '/'
		4,527 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	253.25'	**18.0" Round RCP_Round 18"** L= 47.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 253.25' / 249.30' S= 0.0840 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf
#2	Device 1	253.80'	**12.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	255.60'	**4.2' long x 1.50' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s) 2.2' Crest Height
#4	Device 2	253.55'	**18.0" Vert. Orifice/Grate** C= 0.600
#5	Device 4	253.80'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600
#6	Discarded	253.30'	**8.270 in/hr Exfiltration over Horizontal area** Phase-In= 0.01'
#7	Secondary	253.80'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.49 cfs @ 11.74 hrs HW=253.31' (Free Discharge)
└**6=Exfiltration** (Exfiltration Controls 0.49 cfs)

Primary OutFlow Max=0.53 cfs @ 12.28 hrs HW=254.17' TW=252.00' (Dynamic Tailwater)
└**1=RCP_Round 18"** (Passes 0.53 cfs of 3.68 cfs potential flow)
  └**2=Orifice/Grate** (Orifice Controls 0.53 cfs @ 2.06 fps)
    └**4=Orifice/Grate** (Passes 0.53 cfs of 1.82 cfs potential flow)
      └**5=Orifice/Grate** (Passes 0.53 cfs of 1.60 cfs potential flow)
  └**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=253.30' TW=254.60' (Dynamic Tailwater)
└**7=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond CS8: CHAMBER SYSTEM #8

Inflow Area = 0.270 ac, 85.19% Impervious, Inflow Depth = 2.45" for 2 YR event
Inflow = 0.78 cfs @ 12.07 hrs, Volume= 0.055 af
Outflow = 0.32 cfs @ 12.27 hrs, Volume= 0.055 af, Atten= 58%, Lag= 11.6 min
Discarded = 0.25 cfs @ 11.86 hrs, Volume= 0.053 af
Primary = 0.07 cfs @ 12.27 hrs, Volume= 0.002 af

Routing by Sim-Route method w/Net Flows, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 254.64' @ 12.27 hrs Surf.Area= 1,320 sf Storage= 307 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 4.8 min (796.5 - 791.7)

Volume	Invert	Avail.Storage	Storage Description
#1	254.10'	890 cf	**12.00'W x 110.00'L x 2.10'H Prismatoid** 2,772 cf Overall - 548 cf Embedded = 2,224 cf x 40.0% Voids
#2	254.60'	547 cf	**Cultec C-100HD** x 39 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap Row Length Adjustment= +0.50' x 1.86 sf x 3 rows
#3	254.60'	0 cf	**Cultec C-100-SFCx2** x 4 Inside #1 Effective Size= 10.1"W x 7.6"H => 0.29 sf x 0.33'L = 0.1 cf Overall Size= 12.0"W x 7.6"H x 1.64'L with 1.31' Overlap 4 Chambers in 3 Rows
#4	254.60'	28 cf	**8.0" Round Pipe Storage**-Impervious L= 80.0' S= 0.0100 '/'
#5	254.60'	75 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder** x 2 -Impervious
		1,541 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	254.50'	**8.0" Vert. Orifice/Grate** C= 0.600
#2	Discarded	254.10'	**8.270 in/hr Exfiltration over Horizontal area** Phase-In= 0.01'

Discarded OutFlow Max=0.25 cfs @ 11.86 hrs HW=254.11' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.25 cfs)

Primary OutFlow Max=0.07 cfs @ 12.27 hrs HW=254.64' TW=252.00' (Dynamic Tailwater)
↑—**1=Orifice/Grate** (Orifice Controls 0.07 cfs @ 1.28 fps)

Summary for Link TW: TAIL WATER

Inflow	=	0.60 cfs @	12.27 hrs, Volume=	0.022 af
Primary	=	0.60 cfs @	12.28 hrs, Volume=	0.022 af, Atten= 0%, Lag= 0.6 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Fixed water surface Elevation= 252.00'

Summary for Subcatchment PR1A: SITE AREA

Runoff = 0.69 cfs @ 12.07 hrs, Volume= 0.048 af, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 YR Rainfall=4.50"

	Area (ac)	CN	Description
*	0.130	98	Impervious Area
	0.060	61	>75% Grass cover, Good, HSG B
	0.190	86	Weighted Average
	0.060		31.58% Pervious Area
	0.130		68.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment PR1B: SITE AREA

Runoff = 1.16 cfs @ 12.07 hrs, Volume= 0.079 af, Depth= 2.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 YR Rainfall=4.50"

	Area (ac)	CN	Description
*	0.210	98	Impervious Area
	0.140	61	>75% Grass cover, Good, HSG B
	0.350	83	Weighted Average
	0.140		40.00% Pervious Area
	0.210		60.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment PR1C: SITE AREA

Runoff = 0.45 cfs @ 12.07 hrs, Volume= 0.031 af, Depth= 2.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 YR Rainfall=4.50"

	Area (ac)	CN	Description
*	0.080	98	Impervious Area
	0.060	61	>75% Grass cover, Good, HSG B
	0.140	82	Weighted Average
	0.060		42.86% Pervious Area
	0.080		57.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment PR2: SITE AREA

Runoff = 1.27 cfs @ 12.07 hrs, Volume= 0.090 af, Depth= 3.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 YR Rainfall=4.50"

	Area (ac)	CN	Description
*	0.250	98	Impervious Area
	0.060	61	>75% Grass cover, Good, HSG B
	0.310	91	Weighted Average
	0.060		19.35% Pervious Area
	0.250		80.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment PR2A: SITE & ROOF AREA

Runoff = 3.88 cfs @ 12.07 hrs, Volume= 0.288 af, Depth= 3.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 YR Rainfall=4.50"

	Area (ac)	CN	Description
*	0.250	98	Impervious Area
	0.070	61	>75% Grass cover, Good, HSG B
*	0.560	98	Roof
	0.880	95	Weighted Average
	0.070		7.95% Pervious Area
	0.810		92.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment PR3: SITE

Runoff = 0.85 cfs @ 12.08 hrs, Volume= 0.059 af, Depth= 2.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 YR Rainfall=4.50"

	Area (ac)	CN	Description
*	0.130	98	Impervious Area
	0.200	61	>75% Grass cover, Good, HSG B
	0.330	76	Weighted Average
	0.200		60.61% Pervious Area
	0.130		39.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment PR4: SITE & ROOF AREA

Runoff = 3.82 cfs @ 12.07 hrs, Volume= 0.266 af, Depth= 3.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 YR Rainfall=4.50"

	Area (ac)	CN	Description
*	0.390	98	Impervious Area
	0.260	61	>75% Grass cover, Good, HSG B
*	0.350	98	Roof
	1.000	88	Weighted Average
	0.260		26.00% Pervious Area
	0.740		74.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment PR5: SITE AREA

Runoff = 1.15 cfs @ 12.07 hrs, Volume= 0.083 af, Depth= 3.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 YR Rainfall=4.50"

	Area (ac)	CN	Description
*	0.230	98	Impervious Area
	0.040	61	>75% Grass cover, Good, HSG B
	0.270	93	Weighted Average
	0.040		14.81% Pervious Area
	0.230		85.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment PR6: COVERSE WAY & MISC

Runoff = 1.66 cfs @ 12.08 hrs, Volume= 0.114 af, Depth= 2.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 YR Rainfall=4.50"

	Area (ac)	CN	Description
	0.420	61	>75% Grass cover, Good, HSG B
*	0.250	98	Paved
	0.670	75	Weighted Average
	0.420		62.69% Pervious Area
	0.250		37.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Assumed Tc**

Summary for Reach SUM: TOTAL FLOW

Inflow = 4.89 cfs @ 12.17 hrs, Volume= 0.568 af
Outflow = 4.89 cfs @ 12.18 hrs, Volume= 0.568 af, Atten= 0%, Lag= 0.6 min

Routing by Sim-Route method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Pond CS1: CHAMBER SYSTEM #1

Inflow = 3.07 cfs @ 12.24 hrs, Volume= 0.074 af
Outflow = 2.49 cfs @ 12.26 hrs, Volume= 0.070 af, Atten= 19%, Lag= 1.3 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 2.49 cfs @ 12.26 hrs, Volume= 0.070 af

Routing by Sim-Route method w/Net Flows, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 255.82' @ 12.40 hrs Surf.Area= 816 sf Storage= 652 cf

Plug-Flow detention time= 57.8 min calculated for 0.073 af (95% of inflow)
Center-of-Mass det. time= 31.2 min (818.5 - 785.9)

Volume	Invert	Avail.Storage	Storage Description
#1	254.60'	648 cf	**12.00'W x 68.00'L x 2.80'H Prismatoid** 2,285 cf Overall - 665 cf Embedded = 1,619 cf x 40.0% Voids
#2	255.10'	663 cf	**Cultec R-180** x 30 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 3 rows
#3	255.10'	2 cf	**Cultec HVLV FC-24** x 4 Inside #1 Effective Size= 15.3"W x 12.0"H => 0.91 sf x 0.50'L = 0.5 cf Overall Size= 16.0"W x 12.0"H x 2.02'L with 1.52' Overlap 4 Chambers in 3 Rows
#4	255.10'	57 cf	**12.0" Round Pipe Storage** x 3 -Impervious L= 24.0' S= 0.0200 '/'
#5	255.10'	14 cf	**10.0" Round Pipe Storage**-Impervious L= 25.0' S= 0.0200 '/'
#6	255.50'	63 cf	**4.00'D x 5.00'H Vertical Cone/Cylinder**-Impervious
		1,446 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	254.60'	**8.270 in/hr Exfiltration X 0.00 over Horizontal area**
#2	Primary	255.10'	**12.0" Vert. Orifice/Grate X 2.00** C= 0.600
#3	Primary	258.60'	**2.0" x 2.0" Horiz. Orifice/Grate X 6.00 columns** X 6 rows C= 0.600 in 24.0" x 24.0" Grate (25% open area) Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=254.60' (Free Discharge)
└**1=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=2.10 cfs @ 12.26 hrs HW=255.78' TW=255.63' (Dynamic Tailwater)
├**2=Orifice/Grate** (Orifice Controls 2.10 cfs @ 1.85 fps)
└**3=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond CS2: CHAMBER SYSTEM #2

Inflow	=	5.66 cfs @	12.26 hrs, Volume=	0.179 af
Outflow	=	6.87 cfs @	12.24 hrs, Volume=	0.171 af, Atten= 0%, Lag= 0.0 min
Discarded	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af
Primary	=	4.09 cfs @	12.28 hrs, Volume=	0.145 af
Secondary	=	2.76 cfs @	12.24 hrs, Volume=	0.026 af

Routing by Sim-Route method w/Net Flows, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 255.80' @ 12.24 hrs Surf.Area= 1,584 sf Storage= 1,229 cf

Plug-Flow detention time= 48.9 min calculated for 0.171 af (96% of inflow)
Center-of-Mass det. time= 24.4 min (830.1 - 805.7)

Volume	Invert	Avail.Storage	Storage Description
#1	254.60'	1,244 cf	**16.00'W x 99.00'L x 2.80'H Prismatoid** 4,435 cf Overall - 1,324 cf Embedded = 3,111 cf x 40.0% Voids
#2	255.10'	1,320 cf	**Cultec R-180** x 60 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 4 rows
#3	255.10'	4 cf	**Cultec HVLV FC-24** x 9 Inside #1 Effective Size= 15.3"W x 12.0"H => 0.91 sf x 0.50'L = 0.5 cf Overall Size= 16.0"W x 12.0"H x 2.02'L with 1.52' Overlap 9 Chambers in 4 Rows
#4	255.10'	57 cf	**12.0" Round Pipe Storage** x 3 -Impervious L= 24.0' S= 0.0200 '/'
#5	255.10'	38 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder**-Impervious
#6	255.10'	85 cf	**12.0" Round Pipe Storage**-Impervious L= 108.0' S= 0.0200 '/'
		2,748 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600
#2	Discarded	254.60'	**8.270 in/hr Exfiltration X 0.00 over Horizontal area** Phase-In= 0.01'
#3	Secondary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=254.60' (Free Discharge)
└**2=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=3.84 cfs @ 12.28 hrs HW=255.79' TW=255.57' (Dynamic Tailwater)
└**1=Orifice/Grate** (Orifice Controls 3.84 cfs @ 2.23 fps)

Secondary OutFlow Max=3.40 cfs @ 12.24 hrs HW=255.79' TW=255.63' (Dynamic Tailwater)
└**3=Orifice/Grate** (Orifice Controls 3.40 cfs @ 1.95 fps)

Summary for Pond CS3: CHAMBER SYSTEM #3

Inflow	=	6.48 cfs @	12.28 hrs, Volume=	0.198 af
Outflow	=	7.06 cfs @	12.33 hrs, Volume=	0.192 af, Atten= 0%, Lag= 3.0 min
Discarded	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af
Primary	=	4.22 cfs @	12.33 hrs, Volume=	0.163 af
Secondary	=	3.00 cfs @	12.37 hrs, Volume=	0.030 af

Routing by Sim-Route method w/Net Flows, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 255.85' @ 12.33 hrs Surf.Area= 1,188 sf Storage= 1,005 cf

Plug-Flow detention time= 33.4 min calculated for 0.195 af (97% of inflow)
Center-of-Mass det. time= 15.1 min (844.7 - 829.3)

Volume	Invert	Avail.Storage	Storage Description
#1	254.60'	933 cf	**12.00'W x 99.00'L x 2.80'H Prismatoid** 3,326 cf Overall - 993 cf Embedded = 2,334 cf x 40.0% Voids
#2	255.10'	990 cf	**Cultec R-180** x 45 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 3 rows
#3	255.10'	3 cf	**Cultec HVLV FC-24** x 6 Inside #1 Effective Size= 15.3"W x 12.0"H => 0.91 sf x 0.50'L = 0.5 cf Overall Size= 16.0"W x 12.0"H x 2.02'L with 1.52' Overlap 6 Chambers in 3 Rows
#4	255.10'	57 cf	**12.0" Round Pipe Storage** x 3 -Impervious L= 24.0' S= 0.0200 '/'
#5	255.10'	151 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder** x 4 -Impervious
#6	255.10'	5 cf	**10.0" Round Pipe Storage**-Impervious L= 10.0' S= 0.0200 '/'
		2,139 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600
#2	Discarded	254.60'	**8.270 in/hr Exfiltration X 0.00 over Horizontal area** Phase-In= 0.01'
#3	Secondary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=254.60' (Free Discharge)
└**2=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=4.48 cfs @ 12.33 hrs HW=255.83' TW=255.58' (Dynamic Tailwater)
└**1=Orifice/Grate** (Orifice Controls 4.48 cfs @ 2.42 fps)

Secondary OutFlow Max=3.47 cfs @ 12.37 hrs HW=255.79' TW=255.62' (Dynamic Tailwater)
└**3=Orifice/Grate** (Orifice Controls 3.47 cfs @ 1.99 fps)

Summary for Pond CS4: CHAMBER SYSTEM #4

Inflow	=	5.12 cfs @	12.26 hrs, Volume=	0.258 af
Outflow	=	5.43 cfs @	12.31 hrs, Volume=	0.247 af, Atten= 0%, Lag= 3.3 min
Discarded	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af
Primary	=	4.29 cfs @	12.27 hrs, Volume=	0.224 af
Secondary	=	2.19 cfs @	12.28 hrs, Volume=	0.022 af

Routing by Sim-Route method w/Net Flows, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 255.73' @ 12.31 hrs Surf.Area= 2,375 sf Storage= 1,682 cf

Plug-Flow detention time= 51.7 min calculated for 0.250 af (96% of inflow)
Center-of-Mass det. time= 25.4 min (860.5 - 834.7)

Volume	Invert	Avail.Storage	Storage Description
#1	254.60'	1,967 cf	**25.00'W x 95.00'L x 2.80'H Prismatoid** 6,650 cf Overall - 1,733 cf Embedded = 4,917 cf x 40.0% Voids
#2	255.10'	1,724 cf	**Cultec R-150XLHD** x 63 Inside #1 Effective Size= 29.8"W x 18.0"H => 2.65 sf x 10.25'L = 27.2 cf Overall Size= 33.0"W x 18.5"H x 11.00'L with 0.75' Overlap Row Length Adjustment= +0.75' x 2.65 sf x 7 rows
#3	255.10'	8 cf	**Cultec R-150XLHD-FC-24** x 18 Inside #1 Effective Size= 15.3"W x 12.0"H => 0.91 sf x 0.50'L = 0.5 cf Overall Size= 16.0"W x 12.0"H x 2.02'L with 1.52' Overlap 18 Chambers in 7 Rows
#4	255.10'	82 cf	**10.0" Round Pipe Storage**-Impervious L= 150.0' S= 0.0200 '/'
#5	255.10'	151 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder** x 4 -Impervious
		3,932 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	255.10'	**12.0" Vert. Orifice/Grate X 5.00** C= 0.600
#2	Discarded	254.60'	**8.270 in/hr Exfiltration X 0.00 over Horizontal area** Phase-In= 0.01'
#3	Secondary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=254.60' (Free Discharge)
↑**2=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=3.96 cfs @ 12.27 hrs HW=255.71' TW=255.60' (Dynamic Tailwater)
↑**1=Orifice/Grate** (Orifice Controls 3.96 cfs @ 1.58 fps)

Secondary OutFlow Max=1.88 cfs @ 12.28 hrs HW=255.66' TW=255.57' (Dynamic Tailwater)
↑**3=Orifice/Grate** (Orifice Controls 1.88 cfs @ 1.39 fps)

Summary for Pond CS5: CHAMBER SYSTEM #5

Inflow	=	5.81 cfs @	12.27 hrs, Volume=	0.512 af
Outflow	=	4.34 cfs @	12.30 hrs, Volume=	0.512 af, Atten= 25%, Lag= 1.6 min
Discarded	=	0.80 cfs @	11.67 hrs, Volume=	0.384 af
Primary	=	2.43 cfs @	12.29 hrs, Volume=	0.123 af
Secondary	=	1.43 cfs @	12.30 hrs, Volume=	0.005 af

Routing by Sim-Route method w/Net Flows, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 255.65' @ 12.29 hrs Surf.Area= 4,175 sf Storage= 2,669 cf

Plug-Flow detention time= 10.2 min calculated for 0.520 af (100% of inflow)
Center-of-Mass det. time= 10.2 min (825.4 - 815.0)

Volume	Invert	Avail.Storage	Storage Description
#1	254.60'	3,450 cf	**25.00'W x 167.00'L x 2.80'H Prismatoid** 11,690 cf Overall - 3,066 cf Embedded = 8,624 cf x 40.0% Voids
#2	255.10'	3,055 cf	**Cultec R-150XLHD** x 112 Inside #1 Effective Size= 29.8"W x 18.0"H => 2.65 sf x 10.25'L = 27.2 cf Overall Size= 33.0"W x 18.5"H x 11.00'L with 0.75' Overlap Row Length Adjustment= +0.75' x 2.65 sf x 7 rows
#3	255.10'	11 cf	**Cultec R-150XLHD-FC-24** x 24 Inside #1 Effective Size= 15.3"W x 12.0"H => 0.91 sf x 0.50'L = 0.5 cf Overall Size= 16.0"W x 12.0"H x 2.02'L with 1.52' Overlap 24 Chambers in 7 Rows
#4	255.10'	82 cf	**10.0" Round Pipe Storage**-Impervious L= 150.0' S= 0.0200 '/'
#5	255.10'	151 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder** x 4 -Impervious
		6,748 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600
#2	Discarded	254.60'	**8.270 in/hr Exfiltration over Horizontal area** Phase-In= 0.01'
#3	Secondary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.80 cfs @ 11.67 hrs HW=254.61' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.80 cfs)

Primary OutFlow Max=2.30 cfs @ 12.29 hrs HW=255.65' TW=255.51' (Dynamic Tailwater)
↑—**1=Orifice/Grate** (Orifice Controls 2.30 cfs @ 1.75 fps)

Secondary OutFlow Max=0.00 cfs @ 12.30 hrs HW=255.63' TW=255.64' (Dynamic Tailwater)
↑—**3=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond CS6: CHAMBER SYSTEM #6

Inflow	=	2.79 cfs @	12.29 hrs, Volume=	0.182 af
Outflow	=	2.47 cfs @	12.30 hrs, Volume=	0.182 af, Atten= 12%, Lag= 0.8 min
Discarded	=	0.19 cfs @	11.81 hrs, Volume=	0.061 af
Primary	=	2.28 cfs @	12.30 hrs, Volume=	0.121 af
Secondary	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af

Routing by Sim-Route method w/Net Flows, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 255.54' @ 12.30 hrs Surf.Area= 976 sf Storage= 543 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 5.4 min (785.8 - 780.4)

Volume	Invert	Avail.Storage	Storage Description
#1	254.60'	772 cf	**16.00'W x 61.00'L x 2.80'H Prismatoid** 2,733 cf Overall - 802 cf Embedded = 1,931 cf x 40.0% Voids
#2	255.10'	798 cf	**Cultec R-180** x 36 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 4 rows
#3	255.10'	4 cf	**Cultec HVLV FC-24** x 9 Inside #1 Effective Size= 15.3"W x 12.0"H => 0.91 sf x 0.50'L = 0.5 cf Overall Size= 16.0"W x 12.0"H x 2.02'L with 1.52' Overlap 9 Chambers in 4 Rows
#4	255.10'	47 cf	**12.0" Round Pipe Storage**-Impervious L= 60.0' S= 0.0200 '/'
#5	255.10'	38 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder**-Impervious
		1,659 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600
#2	Discarded	254.60'	**8.270 in/hr Exfiltration over Horizontal area** Phase-In= 0.01'
#3	Secondary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.19 cfs @ 11.81 hrs HW=254.61' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.19 cfs)

Primary OutFlow Max=2.25 cfs @ 12.30 hrs HW=255.54' TW=255.11' (Dynamic Tailwater)
↑—**1=Orifice/Grate** (Orifice Controls 2.25 cfs @ 2.26 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=254.60' TW=254.60' (Dynamic Tailwater)
↑—**3=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond CS7: CHAMBER SYSTEM #7

Inflow	=	4.89 cfs @	12.11 hrs, Volume=	0.387 af
Outflow	=	3.43 cfs @	12.32 hrs, Volume=	0.375 af, Atten= 30%, Lag= 12.7 min
Discarded	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af
Primary	=	3.43 cfs @	12.32 hrs, Volume=	0.375 af
Secondary	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af

Routing by Sim-Route method w/Net Flows, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 255.12' @ 12.32 hrs Surf.Area= 2,544 sf Storage= 3,115 cf

Plug-Flow detention time= 50.0 min calculated for 0.375 af (97% of inflow)
Center-of-Mass det. time= 31.8 min (817.3 - 785.6)

Volume	Invert	Avail.Storage	Storage Description
#1	253.30'	2,185 cf	**12.00'W x 212.00'L x 3.00'H Prismatoid** 7,632 cf Overall - 2,169 cf Embedded = 5,463 cf x 40.0% Voids
#2	253.80'	2,166 cf	**Cultec R-180** x 99 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 3 rows
#3	253.80'	4 cf	**Cultec HVLV FC-24** x 8 Inside #1 Effective Size= 15.3"W x 12.0"H => 0.91 sf x 0.50'L = 0.5 cf Overall Size= 16.0"W x 12.0"H x 2.02'L with 1.52' Overlap 8 Chambers in 3 Rows
#4	253.80'	24 cf	**12.0" Round Pipe Storage**-Impervious L= 30.0' S= 0.0200 '/'
#5	253.80'	75 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder** x 2 -Impervious
#6	253.80'	74 cf	**10.0" Round Pipe Storage**-Impervious L= 135.0' S= 0.0200 '/'
		4,527 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	253.25'	**18.0" Round RCP_Round 18"** L= 47.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 253.25' / 249.30' S= 0.0840 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf
#2	Device 1	253.80'	**12.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	255.60'	**4.2' long x 1.50' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s) 2.2' Crest Height
#4	Device 2	253.55'	**18.0" Vert. Orifice/Grate** C= 0.600
#5	Device 4	253.80'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600
#6	Discarded	253.30'	**8.270 in/hr Exfiltration X 0.00 over Horizontal area** Phase-In= 0.01'
#7	Secondary	253.80'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=253.30' (Free Discharge)
└**6=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=3.43 cfs @ 12.32 hrs HW=255.12' TW=252.00' (Dynamic Tailwater)
└**1=RCP_Round 18"** (Passes 3.43 cfs of 9.01 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 3.43 cfs @ 4.36 fps)
  │ └**4=Orifice/Grate** (Passes 3.43 cfs of 7.71 cfs potential flow)
  │ └**5=Orifice/Grate** (Passes 3.43 cfs of 10.28 cfs potential flow)
  └**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=253.30' TW=254.60' (Dynamic Tailwater)
└**7=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond CS8: CHAMBER SYSTEM #8

Inflow Area = 0.270 ac, 85.19% Impervious, Inflow Depth = 3.71" for 10 YR event
Inflow = 1.15 cfs @ 12.07 hrs, Volume= 0.083 af
Outflow = 0.82 cfs @ 12.15 hrs, Volume= 0.079 af, Atten= 29%, Lag= 4.6 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.82 cfs @ 12.15 hrs, Volume= 0.079 af

Routing by Sim-Route method w/Net Flows, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 255.07' @ 12.15 hrs Surf.Area= 1,320 sf Storage= 731 cf

Plug-Flow detention time= 71.9 min calculated for 0.078 af (94% of inflow)
Center-of-Mass det. time= 39.6 min (820.1 - 780.6)

Volume	Invert	Avail.Storage	Storage Description
#1	254.10'	890 cf	**12.00'W x 110.00'L x 2.10'H Prismatoid** 2,772 cf Overall - 548 cf Embedded = 2,224 cf x 40.0% Voids
#2	254.60'	547 cf	**Cultec C-100HD** x 39 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap Row Length Adjustment= +0.50' x 1.86 sf x 3 rows
#3	254.60'	0 cf	**Cultec C-100-SFCx2** x 4 Inside #1 Effective Size= 10.1"W x 7.6"H => 0.29 sf x 0.33'L = 0.1 cf Overall Size= 12.0"W x 7.6"H x 1.64'L with 1.31' Overlap 4 Chambers in 3 Rows
#4	254.60'	28 cf	**8.0" Round Pipe Storage**-Impervious L= 80.0' S= 0.0100 '/'
#5	254.60'	75 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder** x 2 -Impervious
		1,541 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	254.50'	**8.0" Vert. Orifice/Grate** C= 0.600
#2	Discarded	254.10'	**8.270 in/hr Exfiltration X 0.00 over Horizontal area** Phase-In= 0.01'

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=254.10' (Free Discharge)
↑**2=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=0.82 cfs @ 12.15 hrs HW=255.07' TW=252.00' (Dynamic Tailwater)
↑**1=Orifice/Grate** (Orifice Controls 0.82 cfs @ 2.57 fps)

Summary for Link TW: TAIL WATER

Inflow = 4.04 cfs @ 12.28 hrs, Volume= 0.453 af
Primary = 4.04 cfs @ 12.29 hrs, Volume= 0.453 af, Atten= 0%, Lag= 0.6 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Fixed water surface Elevation= 252.00'

Summary for Subcatchment PR1A: SITE AREA

Runoff = 0.89 cfs @ 12.07 hrs, Volume= 0.062 af, Depth= 3.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 YR Rainfall=5.50"

	Area (ac)	CN	Description
*	0.130	98	Impervious Area
	0.060	61	>75% Grass cover, Good, HSG B
	0.190	86	Weighted Average
	0.060		31.58% Pervious Area
	0.130		68.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment PR1B: SITE AREA

Runoff = 1.53 cfs @ 12.07 hrs, Volume= 0.106 af, Depth= 3.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 YR Rainfall=5.50"

	Area (ac)	CN	Description
*	0.210	98	Impervious Area
	0.140	61	>75% Grass cover, Good, HSG B
	0.350	83	Weighted Average
	0.140		40.00% Pervious Area
	0.210		60.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment PR1C: SITE AREA

Runoff = 0.60 cfs @ 12.07 hrs, Volume= 0.041 af, Depth= 3.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 YR Rainfall=5.50"

	Area (ac)	CN	Description
*	0.080	98	Impervious Area
	0.060	61	>75% Grass cover, Good, HSG B
	0.140	82	Weighted Average
	0.060		42.86% Pervious Area
	0.080		57.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment PR2: SITE AREA

Runoff = 1.60 cfs @ 12.07 hrs, Volume= 0.115 af, Depth= 4.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 YR Rainfall=5.50"

	Area (ac)	CN	Description
*	0.250	98	Impervious Area
	0.060	61	>75% Grass cover, Good, HSG B
	0.310	91	Weighted Average
	0.060		19.35% Pervious Area
	0.250		80.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment PR2A: SITE & ROOF AREA

Runoff = 4.80 cfs @ 12.07 hrs, Volume= 0.360 af, Depth= 4.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 YR Rainfall=5.50"

	Area (ac)	CN	Description
*	0.250	98	Impervious Area
	0.070	61	>75% Grass cover, Good, HSG B
*	0.560	98	Roof
	0.880	95	Weighted Average
	0.070		7.95% Pervious Area
	0.810		92.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment PR3: SITE

Runoff = 1.18 cfs @ 12.08 hrs, Volume= 0.081 af, Depth= 2.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 YR Rainfall=5.50"

	Area (ac)	CN	Description
*	0.130	98	Impervious Area
	0.200	61	>75% Grass cover, Good, HSG B
	0.330	76	Weighted Average
	0.200		60.61% Pervious Area
	0.130		39.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment PR4: SITE & ROOF AREA

Runoff = 4.89 cfs @ 12.07 hrs, Volume= 0.345 af, Depth= 4.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 YR Rainfall=5.50"

	Area (ac)	CN	Description
*	0.390	98	Impervious Area
	0.260	61	>75% Grass cover, Good, HSG B
*	0.350	98	Roof
	1.000	88	Weighted Average
	0.260		26.00% Pervious Area
	0.740		74.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment PR5: SITE AREA

Runoff = 1.44 cfs @ 12.07 hrs, Volume= 0.106 af, Depth= 4.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 YR Rainfall=5.50"

	Area (ac)	CN	Description
*	0.230	98	Impervious Area
	0.040	61	>75% Grass cover, Good, HSG B
	0.270	93	Weighted Average
	0.040		14.81% Pervious Area
	0.230		85.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment PR6: COVERSE WAY & MISC

Runoff = 2.33 cfs @ 12.08 hrs, Volume= 0.160 af, Depth= 2.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 YR Rainfall=5.50"

	Area (ac)	CN	Description
	0.420	61	>75% Grass cover, Good, HSG B
*	0.250	98	Paved
	0.670	75	Weighted Average
	0.420		62.69% Pervious Area
	0.250		37.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Assumed Tc**

Summary for Reach SUM: TOTAL FLOW

Inflow = 7.37 cfs @ 12.25 hrs, Volume= 0.805 af
Outflow = 7.37 cfs @ 12.26 hrs, Volume= 0.805 af, Atten= 0%, Lag= 0.6 min

Routing by Sim-Route method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Pond CS1: CHAMBER SYSTEM #1

Inflow = 5.72 cfs @ 12.39 hrs, Volume= 0.137 af
Outflow = 4.49 cfs @ 12.26 hrs, Volume= 0.133 af, Atten= 21%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 4.49 cfs @ 12.26 hrs, Volume= 0.133 af

Routing by Sim-Route method w/Net Flows, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 256.17' @ 12.33 hrs Surf.Area= 816 sf Storage= 895 cf

Plug-Flow detention time= 35.7 min calculated for 0.137 af (97% of inflow)
Center-of-Mass det. time= 20.5 min (793.2 - 771.9)

Volume	Invert	Avail.Storage	Storage Description
#1	254.60'	648 cf	**12.00'W x 68.00'L x 2.80'H Prismatoid** 2,285 cf Overall - 665 cf Embedded = 1,619 cf x 40.0% Voids
#2	255.10'	663 cf	**Cultec R-180** x 30 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 3 rows
#3	255.10'	2 cf	**Cultec HVLV FC-24** x 4 Inside #1 Effective Size= 15.3"W x 12.0"H => 0.91 sf x 0.50'L = 0.5 cf Overall Size= 16.0"W x 12.0"H x 2.02'L with 1.52' Overlap 4 Chambers in 3 Rows
#4	255.10'	57 cf	**12.0" Round Pipe Storage** x 3 -Impervious L= 24.0' S= 0.0200 '/'
#5	255.10'	14 cf	**10.0" Round Pipe Storage**-Impervious L= 25.0' S= 0.0200 '/'
#6	255.50'	63 cf	**4.00'D x 5.00'H Vertical Cone/Cylinder**-Impervious
		1,446 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	254.60'	**8.270 in/hr Exfiltration X 0.00 over Horizontal area**
#2	Primary	255.10'	**12.0" Vert. Orifice/Grate X 2.00** C= 0.600
#3	Primary	258.60'	**2.0" x 2.0" Horiz. Orifice/Grate X 6.00 columns** X 6 rows C= 0.600 in 24.0" x 24.0" Grate (25% open area) Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=254.60' (Free Discharge)
└**1=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=3.57 cfs @ 12.26 hrs HW=256.06' TW=255.83' (Dynamic Tailwater)
├**2=Orifice/Grate** (Orifice Controls 3.57 cfs @ 2.30 fps)
└**3=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond CS2: CHAMBER SYSTEM #2

Inflow	=	11.64 cfs @	12.33 hrs, Volume=	0.328 af
Outflow	=	13.51 cfs @	12.39 hrs, Volume=	0.321 af, Atten= 0%, Lag= 3.6 min
Discarded	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af
Primary	=	8.09 cfs @	12.39 hrs, Volume=	0.246 af
Secondary	=	5.45 cfs @	12.39 hrs, Volume=	0.074 af

Routing by Sim-Route method w/Net Flows, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 256.16' @ 12.35 hrs Surf.Area= 1,584 sf Storage= 1,684 cf

Plug-Flow detention time= 30.0 min calculated for 0.321 af (98% of inflow)
Center-of-Mass det. time= 16.0 min (801.7 - 785.7)

Volume	Invert	Avail.Storage	Storage Description
#1	254.60'	1,244 cf	**16.00'W x 99.00'L x 2.80'H Prismatoid** 4,435 cf Overall - 1,324 cf Embedded = 3,111 cf x 40.0% Voids
#2	255.10'	1,320 cf	**Cultec R-180** x 60 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 4 rows
#3	255.10'	4 cf	**Cultec HVLV FC-24** x 9 Inside #1 Effective Size= 15.3"W x 12.0"H => 0.91 sf x 0.50'L = 0.5 cf Overall Size= 16.0"W x 12.0"H x 2.02'L with 1.52' Overlap 9 Chambers in 4 Rows
#4	255.10'	57 cf	**12.0" Round Pipe Storage** x 3 -Impervious L= 24.0' S= 0.0200 '/'
#5	255.10'	38 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder**-Impervious
#6	255.10'	85 cf	**12.0" Round Pipe Storage**-Impervious L= 108.0' S= 0.0200 '/'
		2,748 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600
#2	Discarded	254.60'	**8.270 in/hr Exfiltration X 0.00 over Horizontal area** Phase-In= 0.01'
#3	Secondary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=254.60' (Free Discharge)
└**2=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=7.17 cfs @ 12.39 hrs HW=256.10' TW=255.69' (Dynamic Tailwater)
└**1=Orifice/Grate** (Orifice Controls 7.17 cfs @ 3.05 fps)

Secondary OutFlow Max=6.73 cfs @ 12.39 hrs HW=256.13' TW=255.78' (Dynamic Tailwater)
└**3=Orifice/Grate** (Orifice Controls 6.73 cfs @ 2.86 fps)

Summary for Pond CS3: CHAMBER SYSTEM #3

Inflow	=	13.51 cfs @	12.39 hrs, Volume=	0.358 af
Outflow	=	15.41 cfs @	12.29 hrs, Volume=	0.352 af, Atten= 0%, Lag= 0.0 min
Discarded	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af
Primary	=	8.44 cfs @	12.29 hrs, Volume=	0.262 af
Secondary	=	6.97 cfs @	12.29 hrs, Volume=	0.090 af

Routing by Sim-Route method w/Net Flows, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 256.36' @ 12.29 hrs Surf.Area= 1,188 sf Storage= 1,485 cf

Plug-Flow detention time= 20.6 min calculated for 0.357 af (98% of inflow)
Center-of-Mass det. time= 10.1 min (812.7 - 802.4)

Volume	Invert	Avail.Storage	Storage Description
#1	254.60'	933 cf	**12.00'W x 99.00'L x 2.80'H Prismatoid** 3,326 cf Overall - 993 cf Embedded = 2,334 cf x 40.0% Voids
#2	255.10'	990 cf	**Cultec R-180** x 45 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 3 rows
#3	255.10'	3 cf	**Cultec HVLV FC-24** x 6 Inside #1 Effective Size= 15.3"W x 12.0"H => 0.91 sf x 0.50'L = 0.5 cf Overall Size= 16.0"W x 12.0"H x 2.02'L with 1.52' Overlap 6 Chambers in 3 Rows
#4	255.10'	57 cf	**12.0" Round Pipe Storage** x 3 -Impervious L= 24.0' S= 0.0200 '/'
#5	255.10'	151 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder** x 4 -Impervious
#6	255.10'	5 cf	**10.0" Round Pipe Storage**-Impervious L= 10.0' S= 0.0200 '/'
		2,139 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600
#2	Discarded	254.60'	**8.270 in/hr Exfiltration X 0.00 over Horizontal area** Phase-In= 0.01'
#3	Secondary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=254.60' (Free Discharge)
↑—**2=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=8.55 cfs @ 12.29 hrs HW=256.33' TW=255.76' (Dynamic Tailwater)
↑—**1=Orifice/Grate** (Orifice Controls 8.55 cfs @ 3.63 fps)

Secondary OutFlow Max=8.51 cfs @ 12.29 hrs HW=256.31' TW=255.75' (Dynamic Tailwater)
↑—**3=Orifice/Grate** (Orifice Controls 8.51 cfs @ 3.61 fps)

Summary for Pond CS4: CHAMBER SYSTEM #4

Inflow	=	12.00 cfs @	12.29 hrs, Volume=	0.428 af
Outflow	=	12.85 cfs @	12.27 hrs, Volume=	0.417 af, Atten= 0%, Lag= 0.0 min
Discarded	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af
Primary	=	8.87 cfs @	12.38 hrs, Volume=	0.347 af
Secondary	=	5.27 cfs @	12.39 hrs, Volume=	0.070 af

Routing by Sim-Route method w/Net Flows, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 256.08' @ 12.38 hrs Surf.Area= 2,375 sf Storage= 2,318 cf

Plug-Flow detention time= 33.4 min calculated for 0.437 af (97% of inflow)
Center-of-Mass det. time= 17.4 min (828.5 - 810.2)

Volume	Invert	Avail.Storage	Storage Description
#1	254.60'	1,967 cf	**25.00'W x 95.00'L x 2.80'H Prismatoid** 6,650 cf Overall - 1,733 cf Embedded = 4,917 cf x 40.0% Voids
#2	255.10'	1,724 cf	**Cultec R-150XLHD** x 63 Inside #1 Effective Size= 29.8"W x 18.0"H => 2.65 sf x 10.25'L = 27.2 cf Overall Size= 33.0"W x 18.5"H x 11.00'L with 0.75' Overlap Row Length Adjustment= +0.75' x 2.65 sf x 7 rows
#3	255.10'	8 cf	**Cultec R-150XLHD-FC-24** x 18 Inside #1 Effective Size= 15.3"W x 12.0"H => 0.91 sf x 0.50'L = 0.5 cf Overall Size= 16.0"W x 12.0"H x 2.02'L with 1.52' Overlap 18 Chambers in 7 Rows
#4	255.10'	82 cf	**10.0" Round Pipe Storage**-Impervious L= 150.0' S= 0.0200 '/'
#5	255.10'	151 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder** x 4 -Impervious
		3,932 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	255.10'	**12.0" Vert. Orifice/Grate X 5.00** C= 0.600
#2	Discarded	254.60'	**8.270 in/hr Exfiltration X 0.00 over Horizontal area** Phase-In= 0.01'
#3	Secondary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=254.60' (Free Discharge)
↑—**2=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=8.56 cfs @ 12.38 hrs HW=256.04' TW=255.83' (Dynamic Tailwater)
↑—**1=Orifice/Grate** (Orifice Controls 8.56 cfs @ 2.23 fps)

Secondary OutFlow Max=4.29 cfs @ 12.39 hrs HW=255.89' TW=255.70' (Dynamic Tailwater)
↑—**3=Orifice/Grate** (Orifice Controls 4.29 cfs @ 2.14 fps)

Summary for Pond CS5: CHAMBER SYSTEM #5

Inflow	=	10.74 cfs @	12.23 hrs, Volume=	0.711 af
Outflow	=	9.85 cfs @	12.25 hrs, Volume=	0.711 af, Atten= 8%, Lag= 1.1 min
Discarded	=	0.80 cfs @	11.57 hrs, Volume=	0.452 af
Primary	=	7.17 cfs @	12.32 hrs, Volume=	0.208 af
Secondary	=	3.75 cfs @	12.33 hrs, Volume=	0.050 af

Routing by Sim-Route method w/Net Flows, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 255.99' @ 12.32 hrs Surf.Area= 4,175 sf Storage= 3,749 cf

Plug-Flow detention time= 10.1 min calculated for 0.724 af (100% of inflow)
Center-of-Mass det. time= 10.1 min (814.4 - 804.1)

Volume	Invert	Avail.Storage	Storage Description
#1	254.60'	3,450 cf	**25.00'W x 167.00'L x 2.80'H Prismatoid** 11,690 cf Overall - 3,066 cf Embedded = 8,624 cf x 40.0% Voids
#2	255.10'	3,055 cf	**Cultec R-150XLHD** x 112 Inside #1 Effective Size= 29.8"W x 18.0"H => 2.65 sf x 10.25'L = 27.2 cf Overall Size= 33.0"W x 18.5"H x 11.00'L with 0.75' Overlap Row Length Adjustment= +0.75' x 2.65 sf x 7 rows
#3	255.10'	11 cf	**Cultec R-150XLHD-FC-24** x 24 Inside #1 Effective Size= 15.3"W x 12.0"H => 0.91 sf x 0.50'L = 0.5 cf Overall Size= 16.0"W x 12.0"H x 2.02'L with 1.52' Overlap 24 Chambers in 7 Rows
#4	255.10'	82 cf	**10.0" Round Pipe Storage**-Impervious L= 150.0' S= 0.0200 '/'
#5	255.10'	151 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder** x 4 -Impervious
		6,748 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600
#2	Discarded	254.60'	**8.270 in/hr Exfiltration over Horizontal area** Phase-In= 0.01'
#3	Secondary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.80 cfs @ 11.57 hrs HW=254.61' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.80 cfs)

Primary OutFlow Max=6.04 cfs @ 12.32 hrs HW=255.97' TW=255.64' (Dynamic Tailwater)
↑—**1=Orifice/Grate** (Orifice Controls 6.04 cfs @ 2.77 fps)

Secondary OutFlow Max=3.05 cfs @ 12.33 hrs HW=255.91' TW=255.81' (Dynamic Tailwater)
↑—**3=Orifice/Grate** (Orifice Controls 3.05 cfs @ 1.49 fps)

Summary for Pond CS6: CHAMBER SYSTEM #6

Inflow	=	10.48 cfs @	12.32 hrs, Volume=	0.295 af
Outflow	=	10.95 cfs @	12.30 hrs, Volume=	0.295 af, Atten= 0%, Lag= 0.0 min
Discarded	=	0.19 cfs @	11.71 hrs, Volume=	0.074 af
Primary	=	7.81 cfs @	12.26 hrs, Volume=	0.217 af
Secondary	=	3.31 cfs @	12.30 hrs, Volume=	0.004 af

Routing by Sim-Route method w/Net Flows, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 256.10' @ 12.26 hrs Surf.Area= 976 sf Storage= 970 cf

Plug-Flow detention time= 4.6 min calculated for 0.304 af (100% of inflow)
Center-of-Mass det. time= 4.6 min (780.1 - 775.3)

Volume	Invert	Avail.Storage	Storage Description
#1	254.60'	772 cf	**16.00'W x 61.00'L x 2.80'H Prismatoid** 2,733 cf Overall - 802 cf Embedded = 1,931 cf x 40.0% Voids
#2	255.10'	798 cf	**Cultec R-180** x 36 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 4 rows
#3	255.10'	4 cf	**Cultec HVLV FC-24** x 9 Inside #1 Effective Size= 15.3"W x 12.0"H => 0.91 sf x 0.50'L = 0.5 cf Overall Size= 16.0"W x 12.0"H x 2.02'L with 1.52' Overlap 9 Chambers in 4 Rows
#4	255.10'	47 cf	**12.0" Round Pipe Storage**-Impervious L= 60.0' S= 0.0200 '/'
#5	255.10'	38 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder**-Impervious
		1,659 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600
#2	Discarded	254.60'	**8.270 in/hr Exfiltration over Horizontal area** Phase-In= 0.01'
#3	Secondary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.19 cfs @ 11.71 hrs HW=254.61' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.19 cfs)

Primary OutFlow Max=7.56 cfs @ 12.26 hrs HW=256.04' TW=255.51' (Dynamic Tailwater)
↑—**1=Orifice/Grate** (Orifice Controls 7.56 cfs @ 3.29 fps)

Secondary OutFlow Max=5.54 cfs @ 12.26 hrs HW=256.10' TW=255.86' (Dynamic Tailwater)
↑—**3=Orifice/Grate** (Orifice Controls 5.54 cfs @ 2.35 fps)

Summary for Pond CS7: CHAMBER SYSTEM #7

Inflow	=	9.84 cfs @	12.26 hrs, Volume=	0.563 af
Outflow	=	7.38 cfs @	12.32 hrs, Volume=	0.550 af, Atten= 25%, Lag= 3.4 min
Discarded	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af
Primary	=	5.39 cfs @	12.24 hrs, Volume=	0.545 af
Secondary	=	2.93 cfs @	12.32 hrs, Volume=	0.005 af

Routing by Sim-Route method w/Net Flows, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 255.75' @ 12.24 hrs Surf.Area= 2,544 sf Storage= 3,913 cf

Plug-Flow detention time= 39.9 min calculated for 0.551 af (98% of inflow)
Center-of-Mass det. time= 27.0 min (805.5 - 778.5)

Volume	Invert	Avail.Storage	Storage Description
#1	253.30'	2,185 cf	**12.00'W x 212.00'L x 3.00'H Prismatoid** 7,632 cf Overall - 2,169 cf Embedded = 5,463 cf x 40.0% Voids
#2	253.80'	2,166 cf	**Cultec R-180** x 99 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 3 rows
#3	253.80'	4 cf	**Cultec HVLV FC-24** x 8 Inside #1 Effective Size= 15.3"W x 12.0"H => 0.91 sf x 0.50'L = 0.5 cf Overall Size= 16.0"W x 12.0"H x 2.02'L with 1.52' Overlap 8 Chambers in 3 Rows
#4	253.80'	24 cf	**12.0" Round Pipe Storage**-Impervious L= 30.0' S= 0.0200 '/'
#5	253.80'	75 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder** x 2 -Impervious
#6	253.80'	74 cf	**10.0" Round Pipe Storage**-Impervious L= 135.0' S= 0.0200 '/'
		4,527 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	253.25'	**18.0" Round RCP_Round 18"** L= 47.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 253.25' / 249.30' S= 0.0840 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf
#2	Device 1	253.80'	**12.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	255.60'	**4.2' long x 1.50' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s) 2.2' Crest Height
#4	Device 2	253.55'	**18.0" Vert. Orifice/Grate** C= 0.600
#5	Device 4	253.80'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600
#6	Discarded	253.30'	**8.270 in/hr Exfiltration X 0.00 over Horizontal area** Phase-In= 0.01'
#7	Secondary	253.80'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=253.30' (Free Discharge)
└**6=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=5.35 cfs @ 12.24 hrs HW=255.75' TW=252.00' (Dynamic Tailwater)
└**1=RCP_Round 18"** (Passes 5.35 cfs of 11.25 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 4.55 cfs @ 5.80 fps)
  │ └**4=Orifice/Grate** (Passes 4.55 cfs of 10.24 cfs potential flow)
  │ └**5=Orifice/Grate** (Passes 4.55 cfs of 13.66 cfs potential flow)
  └**3=Sharp-Crested Rectangular Weir** (Weir Controls 0.79 cfs @ 1.27 fps)

Secondary OutFlow Max=3.35 cfs @ 12.32 hrs HW=255.63' TW=255.54' (Dynamic Tailwater)
└**7=Orifice/Grate** (Orifice Controls 3.35 cfs @ 1.42 fps)

Summary for Pond CS8: CHAMBER SYSTEM #8

Inflow Area = 0.270 ac, 85.19% Impervious, Inflow Depth = 4.69" for 25 YR event
Inflow = 1.44 cfs @ 12.07 hrs, Volume= 0.106 af
Outflow = 0.99 cfs @ 12.15 hrs, Volume= 0.101 af, Atten= 31%, Lag= 4.8 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.99 cfs @ 12.15 hrs, Volume= 0.101 af

Routing by Sim-Route method w/Net Flows, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 255.18' @ 12.15 hrs Surf.Area= 1,320 sf Storage= 838 cf

Plug-Flow detention time= 63.0 min calculated for 0.101 af (95% of inflow)
Center-of-Mass det. time= 36.2 min (810.8 - 774.5)

Volume	Invert	Avail.Storage	Storage Description
#1	254.10'	890 cf	**12.00'W x 110.00'L x 2.10'H Prismatoid** 2,772 cf Overall - 548 cf Embedded = 2,224 cf x 40.0% Voids
#2	254.60'	547 cf	**Cultec C-100HD** x 39 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap Row Length Adjustment= +0.50' x 1.86 sf x 3 rows
#3	254.60'	0 cf	**Cultec C-100-SFCx2** x 4 Inside #1 Effective Size= 10.1"W x 7.6"H => 0.29 sf x 0.33'L = 0.1 cf Overall Size= 12.0"W x 7.6"H x 1.64'L with 1.31' Overlap 4 Chambers in 3 Rows
#4	254.60'	28 cf	**8.0" Round Pipe Storage**-Impervious L= 80.0' S= 0.0100 '/'
#5	254.60'	75 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder** x 2 -Impervious
		1,541 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	254.50'	**8.0" Vert. Orifice/Grate** C= 0.600
#2	Discarded	254.10'	**8.270 in/hr Exfiltration X 0.00 over Horizontal area** Phase-In= 0.01'

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=254.10' (Free Discharge)
↑**2=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=0.99 cfs @ 12.15 hrs HW=255.18' TW=252.00' (Dynamic Tailwater)
↑**1=Orifice/Grate** (Orifice Controls 0.99 cfs @ 2.85 fps)

Summary for Link TW: TAIL WATER

Inflow = 6.29 cfs @ 12.24 hrs, Volume= 0.645 af
Primary = 6.29 cfs @ 12.25 hrs, Volume= 0.645 af, Atten= 0%, Lag= 0.6 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Fixed water surface Elevation= 252.00'

Summary for Subcatchment PR1A: SITE AREA

Runoff = 1.20 cfs @ 12.07 hrs, Volume= 0.085 af, Depth= 5.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 YR Rainfall=7.00"

	Area (ac)	CN	Description
*	0.130	98	Impervious Area
	0.060	61	>75% Grass cover, Good, HSG B
	0.190	86	Weighted Average
	0.060		31.58% Pervious Area
	0.130		68.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment PR1B: SITE AREA

Runoff = 2.10 cfs @ 12.07 hrs, Volume= 0.147 af, Depth= 5.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 YR Rainfall=7.00"

	Area (ac)	CN	Description
*	0.210	98	Impervious Area
	0.140	61	>75% Grass cover, Good, HSG B
	0.350	83	Weighted Average
	0.140		40.00% Pervious Area
	0.210		60.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment PR1C: SITE AREA

Runoff = 0.82 cfs @ 12.07 hrs, Volume= 0.057 af, Depth= 4.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 YR Rainfall=7.00"

	Area (ac)	CN	Description
*	0.080	98	Impervious Area
	0.060	61	>75% Grass cover, Good, HSG B
	0.140	82	Weighted Average
	0.060		42.86% Pervious Area
	0.080		57.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment PR2: SITE AREA

Runoff = 2.09 cfs @ 12.07 hrs, Volume= 0.153 af, Depth= 5.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 YR Rainfall=7.00"

	Area (ac)	CN	Description
*	0.250	98	Impervious Area
	0.060	61	>75% Grass cover, Good, HSG B
	0.310	91	Weighted Average
	0.060		19.35% Pervious Area
	0.250		80.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment PR2A: SITE & ROOF AREA

Runoff = 6.17 cfs @ 12.07 hrs, Volume= 0.470 af, Depth= 6.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 YR Rainfall=7.00"

	Area (ac)	CN	Description
*	0.250	98	Impervious Area
	0.070	61	>75% Grass cover, Good, HSG B
*	0.560	98	Roof
	0.880	95	Weighted Average
	0.070		7.95% Pervious Area
	0.810		92.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment PR3: SITE

Runoff = 1.70 cfs @ 12.07 hrs, Volume= 0.117 af, Depth= 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 YR Rainfall=7.00"

	Area (ac)	CN	Description
*	0.130	98	Impervious Area
	0.200	61	>75% Grass cover, Good, HSG B
	0.330	76	Weighted Average
	0.200		60.61% Pervious Area
	0.130		39.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment PR4: SITE & ROOF AREA

Runoff = 6.50 cfs @ 12.07 hrs, Volume= 0.466 af, Depth= 5.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 YR Rainfall=7.00"

	Area (ac)	CN	Description
*	0.390	98	Impervious Area
	0.260	61	>75% Grass cover, Good, HSG B
*	0.350	98	Roof
	1.000	88	Weighted Average
	0.260		26.00% Pervious Area
	0.740		74.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment PR5: SITE AREA

Runoff = 1.86 cfs @ 12.07 hrs, Volume= 0.139 af, Depth= 6.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 YR Rainfall=7.00"

	Area (ac)	CN	Description
*	0.230	98	Impervious Area
	0.040	61	>75% Grass cover, Good, HSG B
	0.270	93	Weighted Average
	0.040		14.81% Pervious Area
	0.230		85.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment PR6: COVERSE WAY & MISC

Runoff = 3.38 cfs @ 12.07 hrs, Volume= 0.232 af, Depth= 4.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 YR Rainfall=7.00"

	Area (ac)	CN	Description
	0.420	61	>75% Grass cover, Good, HSG B
*	0.250	98	Paved
	0.670	75	Weighted Average
	0.420		62.69% Pervious Area
	0.250		37.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Assumed Tc**

Summary for Reach SUM: TOTAL FLOW

Inflow = 13.46 cfs @ 12.15 hrs, Volume= 1.176 af
Outflow = 13.46 cfs @ 12.16 hrs, Volume= 1.176 af, Atten= 0%, Lag= 0.6 min

Routing by Sim-Route method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Pond CS1: CHAMBER SYSTEM #1

Inflow = 8.25 cfs @ 12.26 hrs, Volume= 0.250 af
Outflow = 7.38 cfs @ 12.32 hrs, Volume= 0.246 af, Atten= 11%, Lag= 3.7 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 7.38 cfs @ 12.32 hrs, Volume= 0.246 af

Routing by Sim-Route method w/Net Flows, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 257.08' @ 12.32 hrs Surf.Area= 816 sf Storage= 1,299 cf

Plug-Flow detention time= 23.7 min calculated for 0.251 af (98% of inflow)
Center-of-Mass det. time= 15.0 min (779.8 - 764.6)

Volume	Invert	Avail.Storage	Storage Description
#1	254.60'	648 cf	**12.00'W x 68.00'L x 2.80'H Prismatoid** 2,285 cf Overall - 665 cf Embedded = 1,619 cf x 40.0% Voids
#2	255.10'	663 cf	**Cultec R-180** x 30 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 3 rows
#3	255.10'	2 cf	**Cultec HVLV FC-24** x 4 Inside #1 Effective Size= 15.3"W x 12.0"H => 0.91 sf x 0.50'L = 0.5 cf Overall Size= 16.0"W x 12.0"H x 2.02'L with 1.52' Overlap 4 Chambers in 3 Rows
#4	255.10'	57 cf	**12.0" Round Pipe Storage** x 3 -Impervious L= 24.0' S= 0.0200 '/'
#5	255.10'	14 cf	**10.0" Round Pipe Storage**-Impervious L= 25.0' S= 0.0200 '/'
#6	255.50'	63 cf	**4.00'D x 5.00'H Vertical Cone/Cylinder**-Impervious
		1,446 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	254.60'	**8.270 in/hr Exfiltration X 0.00 over Horizontal area**
#2	Primary	255.10'	**12.0" Vert. Orifice/Grate X 2.00** C= 0.600
#3	Primary	258.60'	**2.0" x 2.0" Horiz. Orifice/Grate X 6.00 columns** X 6 rows C= 0.600 in 24.0" x 24.0" Grate (25% open area) Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=254.60' (Free Discharge)
└**1=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=6.48 cfs @ 12.32 hrs HW=256.89' TW=256.15' (Dynamic Tailwater)
├**2=Orifice/Grate** (Orifice Controls 6.48 cfs @ 4.13 fps)
└**3=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond CS2: CHAMBER SYSTEM #2

Inflow	=	18.52 cfs @	12.28 hrs, Volume=	0.581 af
Outflow	=	18.89 cfs @	12.30 hrs, Volume=	0.573 af, Atten= 0%, Lag= 1.2 min
Discarded	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af
Primary	=	11.14 cfs @	12.30 hrs, Volume=	0.408 af
Secondary	=	7.77 cfs @	12.30 hrs, Volume=	0.165 af

Routing by Sim-Route method w/Net Flows, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 256.93' @ 12.30 hrs Surf.Area= 1,584 sf Storage= 2,401 cf

Plug-Flow detention time= 20.0 min calculated for 0.573 af (99% of inflow)
Center-of-Mass det. time= 11.9 min (787.1 - 775.2)

Volume	Invert	Avail.Storage	Storage Description
#1	254.60'	1,244 cf	**16.00'W x 99.00'L x 2.80'H Prismatoid** 4,435 cf Overall - 1,324 cf Embedded = 3,111 cf x 40.0% Voids
#2	255.10'	1,320 cf	**Cultec R-180** x 60 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 4 rows
#3	255.10'	4 cf	**Cultec HVLV FC-24** x 9 Inside #1 Effective Size= 15.3"W x 12.0"H => 0.91 sf x 0.50'L = 0.5 cf Overall Size= 16.0"W x 12.0"H x 2.02'L with 1.52' Overlap 9 Chambers in 4 Rows
#4	255.10'	57 cf	**12.0" Round Pipe Storage** x 3 -Impervious L= 24.0' S= 0.0200 '/'
#5	255.10'	38 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder**-Impervious
#6	255.10'	85 cf	**12.0" Round Pipe Storage**-Impervious L= 108.0' S= 0.0200 '/'
		2,748 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600
#2	Discarded	254.60'	**8.270 in/hr Exfiltration X 0.00 over Horizontal area** Phase-In= 0.01'
#3	Secondary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=254.60' (Free Discharge)
↑—**2=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=9.42 cfs @ 12.30 hrs HW=256.78' TW=256.09' (Dynamic Tailwater)
↑—**1=Orifice/Grate** (Orifice Controls 9.42 cfs @ 4.00 fps)

Secondary OutFlow Max=8.88 cfs @ 12.30 hrs HW=256.83' TW=256.22' (Dynamic Tailwater)
↑—**3=Orifice/Grate** (Orifice Controls 8.88 cfs @ 3.77 fps)

Summary for Pond CS3: CHAMBER SYSTEM #3

Inflow	=	18.78 cfs @	12.30 hrs, Volume=	0.596 af
Outflow	=	21.61 cfs @	12.28 hrs, Volume=	0.590 af, Atten= 0%, Lag= 0.0 min
Discarded	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af
Primary	=	11.16 cfs @	12.28 hrs, Volume=	0.402 af
Secondary	=	10.48 cfs @	12.28 hrs, Volume=	0.188 af

Routing by Sim-Route method w/Net Flows, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 257.11' @ 12.32 hrs Surf.Area= 1,188 sf Storage= 1,951 cf

Plug-Flow detention time= 14.6 min calculated for 0.595 af (99% of inflow)
Center-of-Mass det. time= 8.1 min (798.2 - 790.0)

Volume	Invert	Avail.Storage	Storage Description
#1	254.60'	933 cf	**12.00'W x 99.00'L x 2.80'H Prismatoid** 3,326 cf Overall - 993 cf Embedded = 2,334 cf x 40.0% Voids
#2	255.10'	990 cf	**Cultec R-180** x 45 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 3 rows
#3	255.10'	3 cf	**Cultec HVLV FC-24** x 6 Inside #1 Effective Size= 15.3"W x 12.0"H => 0.91 sf x 0.50'L = 0.5 cf Overall Size= 16.0"W x 12.0"H x 2.02'L with 1.52' Overlap 6 Chambers in 3 Rows
#4	255.10'	57 cf	**12.0" Round Pipe Storage** x 3 -Impervious L= 24.0' S= 0.0200 '/'
#5	255.10'	151 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder** x 4 -Impervious
#6	255.10'	5 cf	**10.0" Round Pipe Storage**-Impervious L= 10.0' S= 0.0200 '/'
		2,139 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600
#2	Discarded	254.60'	**8.270 in/hr Exfiltration X 0.00 over Horizontal area** Phase-In= 0.01'
#3	Secondary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=254.60' (Free Discharge)
↑—**2=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=10.85 cfs @ 12.28 hrs HW=257.04' TW=256.13' (Dynamic Tailwater)
↑—**1=Orifice/Grate** (Orifice Controls 10.85 cfs @ 4.61 fps)

Secondary OutFlow Max=11.33 cfs @ 12.28 hrs HW=256.99' TW=255.99' (Dynamic Tailwater)
↑—**3=Orifice/Grate** (Orifice Controls 11.33 cfs @ 4.81 fps)

Summary for Pond CS4: CHAMBER SYSTEM #4

Inflow	=	17.46 cfs @	12.28 hrs, Volume=	0.645 af
Outflow	=	15.41 cfs @	12.30 hrs, Volume=	0.633 af, Atten= 12%, Lag= 1.1 min
Discarded	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af
Primary	=	8.91 cfs @	12.69 hrs, Volume=	0.502 af
Secondary	=	7.51 cfs @	12.22 hrs, Volume=	0.131 af

Routing by Sim-Route method w/Net Flows, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 256.61' @ 12.33 hrs Surf.Area= 2,375 sf Storage= 3,060 cf

Plug-Flow detention time= 24.8 min calculated for 0.688 af (98% of inflow)
Center-of-Mass det. time= 14.2 min (815.4 - 799.8)

Volume	Invert	Avail.Storage	Storage Description
#1	254.60'	1,967 cf	**25.00'W x 95.00'L x 2.80'H Prismatoid** 6,650 cf Overall - 1,733 cf Embedded = 4,917 cf x 40.0% Voids
#2	255.10'	1,724 cf	**Cultec R-150XLHD** x 63 Inside #1 Effective Size= 29.8"W x 18.0"H => 2.65 sf x 10.25'L = 27.2 cf Overall Size= 33.0"W x 18.5"H x 11.00'L with 0.75' Overlap Row Length Adjustment= +0.75' x 2.65 sf x 7 rows
#3	255.10'	8 cf	**Cultec R-150XLHD-FC-24** x 18 Inside #1 Effective Size= 15.3"W x 12.0"H => 0.91 sf x 0.50'L = 0.5 cf Overall Size= 16.0"W x 12.0"H x 2.02'L with 1.52' Overlap 18 Chambers in 7 Rows
#4	255.10'	82 cf	**10.0" Round Pipe Storage**-Impervious L= 150.0' S= 0.0200 '/'
#5	255.10'	151 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder** x 4 -Impervious
		3,932 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	255.10'	**12.0" Vert. Orifice/Grate X 5.00** C= 0.600
#2	Discarded	254.60'	**8.270 in/hr Exfiltration X 0.00 over Horizontal area** Phase-In= 0.01'
#3	Secondary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=254.60' (Free Discharge)
└**2=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=8.45 cfs @ 12.69 hrs HW=256.14' TW=255.94' (Dynamic Tailwater)
└**1=Orifice/Grate** (Orifice Controls 8.45 cfs @ 2.15 fps)

Secondary OutFlow Max=5.76 cfs @ 12.22 hrs HW=256.32' TW=256.07' (Dynamic Tailwater)
└**3=Orifice/Grate** (Orifice Controls 5.76 cfs @ 2.44 fps)

Summary for Pond CS5: CHAMBER SYSTEM #5

Inflow	=	11.25 cfs @	12.10 hrs, Volume=	0.980 af
Outflow	=	9.22 cfs @	12.38 hrs, Volume=	0.980 af, Atten= 18%, Lag= 16.8 min
Discarded	=	0.80 cfs @	11.20 hrs, Volume=	0.552 af
Primary	=	8.42 cfs @	12.38 hrs, Volume=	0.339 af
Secondary	=	5.68 cfs @	12.20 hrs, Volume=	0.089 af

Routing by Sim-Route method w/Net Flows, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 256.33' @ 12.28 hrs Surf.Area= 4,175 sf Storage= 4,702 cf

Plug-Flow detention time= 10.3 min calculated for 1.027 af (100% of inflow)
Center-of-Mass det. time= 10.3 min (807.5 - 796.7)

Volume	Invert	Avail.Storage	Storage Description
#1	254.60'	3,450 cf	**25.00'W x 167.00'L x 2.80'H Prismatoid** 11,690 cf Overall - 3,066 cf Embedded = 8,624 cf x 40.0% Voids
#2	255.10'	3,055 cf	**Cultec R-150XLHD** x 112 Inside #1 Effective Size= 29.8"W x 18.0"H => 2.65 sf x 10.25'L = 27.2 cf Overall Size= 33.0"W x 18.5"H x 11.00'L with 0.75' Overlap Row Length Adjustment= +0.75' x 2.65 sf x 7 rows
#3	255.10'	11 cf	**Cultec R-150XLHD-FC-24** x 24 Inside #1 Effective Size= 15.3"W x 12.0"H => 0.91 sf x 0.50'L = 0.5 cf Overall Size= 16.0"W x 12.0"H x 2.02'L with 1.52' Overlap 24 Chambers in 7 Rows
#4	255.10'	82 cf	**10.0" Round Pipe Storage**-Impervious L= 150.0' S= 0.0200 '/'
#5	255.10'	151 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder** x 4 -Impervious
		6,748 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600
#2	Discarded	254.60'	**8.270 in/hr Exfiltration over Horizontal area** Phase-In= 0.01'
#3	Secondary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.80 cfs @ 11.20 hrs HW=254.61' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.80 cfs)

Primary OutFlow Max=6.54 cfs @ 12.38 hrs HW=256.29' TW=255.95' (Dynamic Tailwater)
↑—**1=Orifice/Grate** (Orifice Controls 6.54 cfs @ 2.78 fps)

Secondary OutFlow Max=2.72 cfs @ 12.20 hrs HW=256.27' TW=256.21' (Dynamic Tailwater)
↑—**3=Orifice/Grate** (Orifice Controls 2.72 cfs @ 1.16 fps)

Summary for Pond CS6: CHAMBER SYSTEM #6

Inflow	=	12.85 cfs @	12.11 hrs, Volume=	0.471 af
Outflow	=	14.11 cfs @	12.16 hrs, Volume=	0.471 af, Atten= 0%, Lag= 3.0 min
Discarded	=	0.19 cfs @	11.62 hrs, Volume=	0.092 af
Primary	=	10.07 cfs @	12.47 hrs, Volume=	0.372 af
Secondary	=	5.14 cfs @	12.16 hrs, Volume=	0.007 af

Routing by Sim-Route method w/Net Flows, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 256.49' @ 12.31 hrs Surf.Area= 976 sf Storage= 1,240 cf

Plug-Flow detention time= 3.9 min calculated for 0.521 af (100% of inflow)
Center-of-Mass det. time= 3.9 min (778.3 - 774.0)

Volume	Invert	Avail.Storage	Storage Description
#1	254.60'	772 cf	**16.00'W x 61.00'L x 2.80'H Prismatoid** 2,733 cf Overall - 802 cf Embedded = 1,931 cf x 40.0% Voids
#2	255.10'	798 cf	**Cultec R-180** x 36 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 4 rows
#3	255.10'	4 cf	**Cultec HVLV FC-24** x 9 Inside #1 Effective Size= 15.3"W x 12.0"H => 0.91 sf x 0.50'L = 0.5 cf Overall Size= 16.0"W x 12.0"H x 2.02'L with 1.52' Overlap 9 Chambers in 4 Rows
#4	255.10'	47 cf	**12.0" Round Pipe Storage**-Impervious L= 60.0' S= 0.0200 '/'
#5	255.10'	38 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder**-Impervious
		1,659 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600
#2	Discarded	254.60'	**8.270 in/hr Exfiltration over Horizontal area** Phase-In= 0.01'
#3	Secondary	255.10'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.19 cfs @ 11.62 hrs HW=254.61' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.19 cfs)

Primary OutFlow Max=9.20 cfs @ 12.47 hrs HW=256.29' TW=255.64' (Dynamic Tailwater)
↑—**1=Orifice/Grate** (Orifice Controls 9.20 cfs @ 3.90 fps)

Secondary OutFlow Max=7.03 cfs @ 12.12 hrs HW=256.42' TW=256.04' (Dynamic Tailwater)
↑—**3=Orifice/Grate** (Orifice Controls 7.03 cfs @ 2.99 fps)

Summary for Pond CS7: CHAMBER SYSTEM #7

Inflow	=	13.87 cfs @	12.12 hrs, Volume=	0.838 af
Outflow	=	12.91 cfs @	12.14 hrs, Volume=	0.825 af, Atten= 7%, Lag= 1.0 min
Discarded	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af
Primary	=	9.84 cfs @	12.14 hrs, Volume=	0.810 af
Secondary	=	4.88 cfs @	12.11 hrs, Volume=	0.015 af

Routing by Sim-Route method w/Net Flows, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 256.10' @ 12.14 hrs Surf.Area= 2,544 sf Storage= 4,280 cf

Plug-Flow detention time= 31.2 min calculated for 0.835 af (99% of inflow)
Center-of-Mass det. time= 22.2 min (796.0 - 773.5)

Volume	Invert	Avail.Storage	Storage Description
#1	253.30'	2,185 cf	**12.00'W x 212.00'L x 3.00'H Prismatoid** 7,632 cf Overall - 2,169 cf Embedded = 5,463 cf x 40.0% Voids
#2	253.80'	2,166 cf	**Cultec R-180** x 99 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 3 rows
#3	253.80'	4 cf	**Cultec HVLV FC-24** x 8 Inside #1 Effective Size= 15.3"W x 12.0"H => 0.91 sf x 0.50'L = 0.5 cf Overall Size= 16.0"W x 12.0"H x 2.02'L with 1.52' Overlap 8 Chambers in 3 Rows
#4	253.80'	24 cf	**12.0" Round Pipe Storage**-Impervious L= 30.0' S= 0.0200 '/'
#5	253.80'	75 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder** x 2 -Impervious
#6	253.80'	74 cf	**10.0" Round Pipe Storage**-Impervious L= 135.0' S= 0.0200 '/'
		4,527 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	253.25'	**18.0" Round RCP_Round 18"** L= 47.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 253.25' / 249.30' S= 0.0840 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf
#2	Device 1	253.80'	**12.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	255.60'	**4.2' long x 1.50' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s) 2.2' Crest Height
#4	Device 2	253.55'	**18.0" Vert. Orifice/Grate** C= 0.600
#5	Device 4	253.80'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600
#6	Discarded	253.30'	**8.270 in/hr Exfiltration X 0.00 over Horizontal area** Phase-In= 0.01'
#7	Secondary	253.80'	**12.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=253.30' (Free Discharge)
└**6=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=9.38 cfs @ 12.14 hrs HW=256.06' TW=252.00' (Dynamic Tailwater)
└**1=RCP_Round 18"** (Passes 9.38 cfs of 12.23 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 5.02 cfs @ 6.40 fps)
  │ └**4=Orifice/Grate** (Passes 5.02 cfs of 11.30 cfs potential flow)
  │ └**5=Orifice/Grate** (Passes 5.02 cfs of 15.07 cfs potential flow)
  └**3=Sharp-Crested Rectangular Weir** (Weir Controls 4.36 cfs @ 2.29 fps)

Secondary OutFlow Max=3.90 cfs @ 12.11 hrs HW=255.92' TW=255.80' (Dynamic Tailwater)
└**7=Orifice/Grate** (Orifice Controls 3.90 cfs @ 1.66 fps)

Summary for Pond CS8: CHAMBER SYSTEM #8

Inflow Area = 0.270 ac, 85.19% Impervious, Inflow Depth = 6.17" for 100 YR event
Inflow = 1.86 cfs @ 12.07 hrs, Volume= 0.139 af
Outflow = 1.24 cfs @ 12.16 hrs, Volume= 0.134 af, Atten= 33%, Lag= 5.1 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 1.24 cfs @ 12.16 hrs, Volume= 0.134 af

Routing by Sim-Route method w/Net Flows, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 255.38' @ 12.16 hrs Surf.Area= 1,320 sf Storage= 1,011 cf

Plug-Flow detention time= 53.8 min calculated for 0.134 af (96% of inflow)
Center-of-Mass det. time= 32.7 min (800.6 - 767.9)

Volume	Invert	Avail.Storage	Storage Description
#1	254.10'	890 cf	**12.00'W x 110.00'L x 2.10'H Prismatoid** 2,772 cf Overall - 548 cf Embedded = 2,224 cf x 40.0% Voids
#2	254.60'	547 cf	**Cultec C-100HD** x 39 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap Row Length Adjustment= +0.50' x 1.86 sf x 3 rows
#3	254.60'	0 cf	**Cultec C-100-SFCx2** x 4 Inside #1 Effective Size= 10.1"W x 7.6"H => 0.29 sf x 0.33'L = 0.1 cf Overall Size= 12.0"W x 7.6"H x 1.64'L with 1.31' Overlap 4 Chambers in 3 Rows
#4	254.60'	28 cf	**8.0" Round Pipe Storage**-Impervious L= 80.0' S= 0.0100 '/'
#5	254.60'	75 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder** x 2 -Impervious
		1,541 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	254.50'	**8.0" Vert. Orifice/Grate** C= 0.600
#2	Discarded	254.10'	**8.270 in/hr Exfiltration X 0.00 over Horizontal area** Phase-In= 0.01'

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=254.10' (Free Discharge)
↑**2=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=1.24 cfs @ 12.16 hrs HW=255.38' TW=252.00' (Dynamic Tailwater)
↑**1=Orifice/Grate** (Orifice Controls 1.24 cfs @ 3.55 fps)

Summary for Link TW: TAIL WATER

Inflow = 11.07 cfs @ 12.14 hrs, Volume= 0.944 af
Primary = 11.07 cfs @ 12.15 hrs, Volume= 0.944 af, Atten= 0%, Lag= 0.6 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Fixed water surface Elevation= 252.00'